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Seamanship



U. S. C. G. C. Eagle

U. S. Coast Guard Academy

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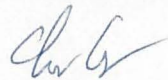
Professor John Lyman
404 Clayton Road
Chapel Hill, North Carolina 27514

Dear John:

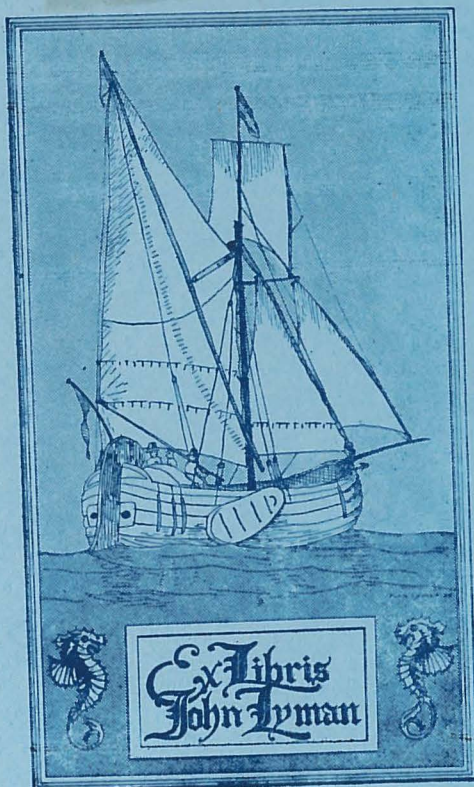
I particularly enjoyed your succinct summary of last year's oceanographic effort in the recent GEOTIMES. A job extremely well done!

Knowing your interest in sailing ships, I thought you might like a copy of the EAGLE Seamanship Manual issued to our Coast Guard "plebes."

Sincerely,



CHARLES C. BATES



1 June 1966

LETTER OF PROMULGATION

1. The EAGLE SEAMANSHIP MANUAL is hereby promulgated for the government of sailing and seamanship procedures to be followed by all personnel assigned to duty on board the USCGC EAGLE (WIX 327).
2. The EAGLE SEAMANSHIP MANUAL includes general rules and procedures relating to the handling of sails and to the ship while under sail. It also contains the terminology as used on this vessel.
3. All changes to this publication shall be promulgated as consecutively numbered changes. The previous edition, dated June 1965, will remain in effect.

A handwritten signature in dark ink, appearing to read "S. G. Carkeek", written in a cursive style.

S. G. CARKEEK
Captain, USCG
Head, Professional Studies Department

EAGLE SEAMANSHIP

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CHAPTER 1

DESCRIPTION OF THE EAGLE

A. HISTORICAL BACKGROUND

The Coast Guard Academy was first known as the Revenue Cutter Service School of Instruction. It was started aboard the Revenue Cutter DOBBIN on May 15, 1877. DOBBIN was a two-masted topsail schooner similar to the other cutters then in service. The only cadet practice cruise in DOBBIN visited St. George Bermuda, Provincetown Massachusetts, Portland Maine, and the Azores Islands. In the fall of 1877 she secured for the school year in winter quarters, to be replaced the following year by another vessel.

The bark SAMUEL B. CHASE was commissioned in 1878 as the cadet training ship. She was lengthened from 106' to 114' shortly after and continued to serve faithfully for 30 years.

The next cadet training ship was the old ITASCA which served from 1908 to 1921. She had been built by the Navy expressly as a training ship. However, she was not particularly successful because she was simply a scaled down version of a larger vessel. All dimensions including hatch sizes, bunk lengths, overhead clearances, etc. were reduced, thus making her uncomfortable to say the least.

The gunboat VICKSBURG, an auxiliary barkentine, was obtained from the Navy in 1921 and renamed for the first Secretary, ALEXANDER HAMILTON, to serve as the next cadet training ship. She served well until 1930 when regular cutters were first assigned for the cadet practice cruise. Using temporarily assigned cruising cutters for the cadet cruise became regular routine until 1942 when the Danish Training Vessel DANMARK made herself available to the United States for the period of the World War II occupation of Denmark. DANMARK was a full-rigger and training in sail on the cadet cruise, which had been suspended in 1930, was resumed. Cadets practiced in regular service vessels again in 1945 and 1946 and then resumed training in sail.

Our present training ship was built by Blohm & Voss in Hamburg, Germany, and was launched in 1936. As HORST WESSEL she sailed in the Atlantic as a training vessel for cadets of the German Navy, visiting such ports as St. Thomas, V. I. and Santa Cruz de Tenerife, C. I. During the war her operation was confined to the Baltic. She continued her training mission but at one time she served also for logistic service to East Prussian ports and for evacuation of refugees.

After the capitulation, the remains of the German fleet was divided amongst the allied countries. United States was awarded HORST WESSEL and the Coast Guard was designated as the service to take her. In January 1946, ten Coast Guard officers and men went aboard her in Bremerhaven to take possession and change her name to EAGLE. The entire spring was spent collecting gear from all over Germany and outfitting her. Additional Coast Guard personnel were sent over, and in early summer she was sailed to New London. It was too late in the year to use the ship for a regular training cruise, but starting in 1947 every Cadet Cruise has included the 3 masted bark EAGLE as the flagship of the Cadet Practice Squadron.

This is the 6th Coast Guard vessel to bear the name EAGLE. The first Coast Guard Cutter EAGLE (then Revenue Cutter) was built in 1798 at Philadelphia. She was a 187-ton brig, 58 feet on the keel, 20 foot beam, and 9 foot depth of hold. She was manned by a crew of 70, and was armed with 14 six-pounders. Her record under Captain Hugh G. Campbell in the Quasi-War with France was splendid. Most of the duty consisted of convoying American cargo vessels safely through Caribbean waters against the raids by the 60 to 80 French privateers operating out of Martinique and Guadeloupe. During the two and a half years she was employed the EAGLE captured 5 Frenchmen, recaptured 7 American vessels, and assisted in capturing or retaking 10 other French or American vessels. Following the close of hostilities in 1801 the vessel was sold.

The second EAGLE was a cutter which operated out of New London, Connecticut, from 1809 until 1814. She had a crew of approximately 25 men and was armed with 4 four-pounders. Her principal duty was the prevention of smuggling and protecting our commerce in Long Island Sound. During the War of 1812, the British would use small captured American craft, manned and armed by themselves to attack our shipping in the sound. To prevent this the EAGLE would convoy our merchant shipping up and down the shores of Long Island and Connecticut. In October 1814, the sloop SUSAN of New Haven was set upon unexpectedly by a Long Island sloop which had been armed and manned by the British frigate POMONE. The EAGLE set out from New Haven with her crew and forty volunteers to try and recapture the SUSAN. However, she encountered some superior opposition from the enemy in the form of the POMONE'S tender and the British 18-gun brig DISPATCH. These vessels closed in on the EAGLE, who ran ashore under the lee of the bluff at Negros Head, Long Island. Here the men hauled the cutter's guns ashore and stood off the British ships by firing the guns from the heights. In the fight the cutter's masts were shot away, and a volunteer erected the flag on the stern. This was also shot away, but a tar replaced it where it remained throughout the rest of the engagement. During the fight the EAGLE'S men were forced to tear up the log to make cartridges. The British finally withdrew, and several days later Captain Frederick Lee of the EAGLE refloated the dismasted and badly holed cutter. Unfortunately, while she was being towed back to New Haven a British force seized the vessel.

Through the courtesy of Mr. Alexander Victor, the librarian of Yale University, the Academy is now in possession of a bill of sale for powder and shot purchased by this EAGLE in New Haven. This powder and shot was undoubtedly used to repel the British during the engagement at Negros Head.

The next two cutters to bear the name of EAGLE were both operated out of New Haven and were both commanded by the same captain who had fought off the British so heroically at Negros Head - Captain Frederick Lee, later to have a cutter named in his honor. The third EAGLE was in commission from 1816 to 1824, and the fourth vessel to be called the EAGLE was in commission from 1824 to 1829.

Almost a hundred years passed between the commissioning of the fourth EAGLE and the fifth vessel so called. In 1925 a staunch 100-foot patrol boat was completed and bore this famous name. She was built to engage in the Coast Guard's rum patrol. Fast destroyers were used to sweep the sea for several hundred miles from the coast, and when a rum-runner was found, vessels of the 100 and

125 classes were sent out to picket the "black". They stayed with the runner until he gave up the attempt to contact the faster and smaller shore craft that went out to run the inshore blockade. The fifth EAGLE spent nine years in this type of work and in the other humanitarian services rendered by the Coast Guard. She was decommissioned in 1934.

It is interesting to note that all the Coast Guard vessels bearing this name, except the first, have based along the Connecticut shore.

B. PRINCIPAL DIMENSIONS

LENGTH - Overall (counter to tip of bowsprit)	295 feet
LENGTH - Without bowsprit	277 feet
LENGTH - Between perpendiculars (water line)	231 feet
BEAM - Greatest	39.1 feet
FREEBOARD -	9.1 feet
DRAFT - Fully loaded	17.0 feet
DISPLACEMENT - fully loaded	1816 tons
VOLUME - gross tonnage	1500 B.R.T.
BALLAST - iron pigs	344 tons
FUEL OIL -	24,215 gals.
WATER -	56,140 gals.
HEIGHT OF FORETRUCK - above water line	150.3 feet
HEIGHT OF MAINTRUCK -	150.3 feet
HEIGHT OF MIZZENTRUCK -	132.0 feet
FORE AND MAINYARD -	78.8 feet
SAIL AREA -	21,350.9 sq. ft.
MOTOR - auxiliary (M.A.N. Diesel)	728 horsepower
SPEED - under power (flat calm)	10 knots
ANCHORS - (2 - patent)	3800 lbs each
CHAIN - (starboard 150 fathoms, port 135 fathoms) (diameter of chain is 1.76 inches)	

C. HULL CONSTRUCTION

The EAGLE is built of German steel on the transverse framing system. Details of construction are very similar to American practice of the same time. Examination of the CAMPBELL and the EAGLE will demonstrate that they are welded in similar places and riveted in similar places. When these vessels were built the fully welded technique had not yet been developed. In general the seams are riveted and the butts are welded. Fittings are generally bolted on while strength members such as knees and gussets are welded to the frames. The plating is of approximately 4/10ths inch thickness.

There are two full length steel decks, a platform deck below these, and a raised forecastle and quarter-deck. The weather-decks have a 3-inch teak deck laid on top of the steel. The second deck has a 3-inch pine deck covered with vinyl tile. The platform deck and the tank tops are steel.

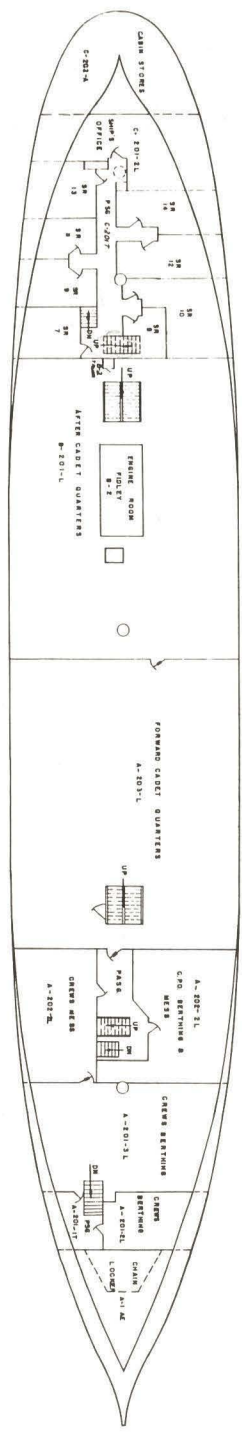
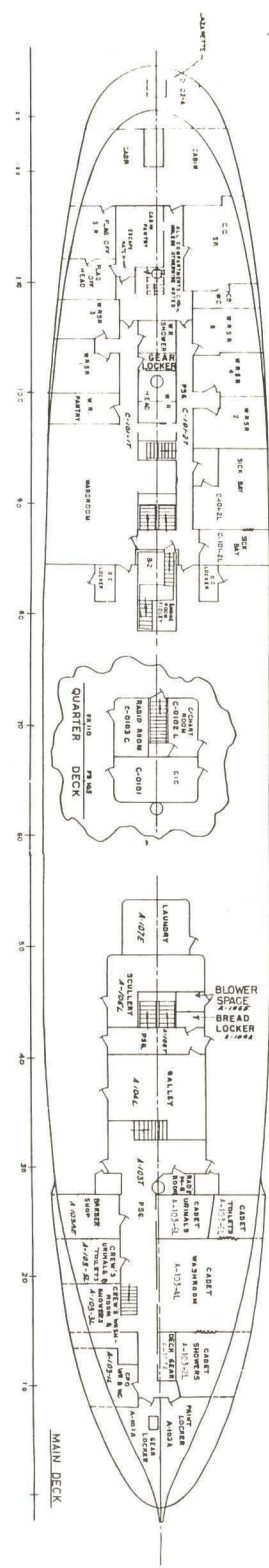
The second deck is the damage control deck. There are six watertight bulkheads which run to the main deck but which have watertight doors on the second, or living, deck level. Perusal of the attached drawings will show that the main deck under the forecastle contains the paint locker, washrooms, and heads. The crew's quarters are forward on the second deck followed by two large compartments which compose the cadet quarters. Aft of this, under the quarter-deck, are the officer's quarters. Under the crew's quarters are commissary holds and refrigerator spaces. Under the cadet quarters are stowage spaces carpenter shop, sailmaker's shop, etc. Under this platform are found the water and fuel tanks. Under the after cadet quarters are the engine room spaces. Under the officer's quarters, aft, are miscellaneous storerooms. The galley is on the main deck abaft the forecastle, and the cadet berthing compartments double as messing compartments.

It will be noted that all these compartments bear numbers, which according to a definite system established by the U. S. Navy, locate the compartment in the ship and tell its purpose. Specifically, all compartments forward of the engine room spaces bear the prefix A, the engine and auxiliary engine room spaces B, and those aft of the engine room bulkhead C. Compartments on the main deck bear numbers starting with 1 and suffixes such as L (living). The compartments on the second deck have numbers beginning with 2, those to starboard ending with odd numbers, those to port ending with even numbers.

Look the following plans over carefully and check them when on board the ship.

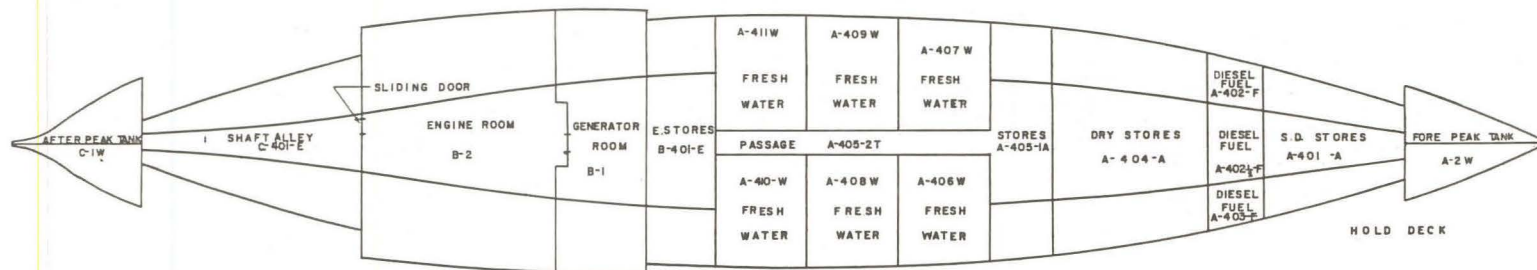
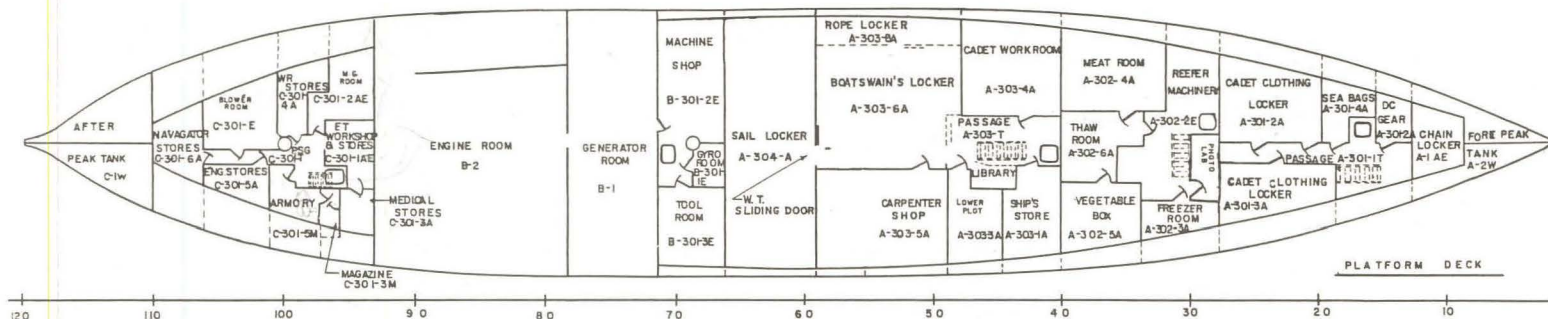
D. MASTS AND SPARS

The lower masts, topmasts, the topgallant masts, the royal masts, bowsprit, yards, booms, and mizzen gaff are all made of hollow steel tubes. All of these various appurtenances of the ship are known as spars. The foremast is stepped on the second deck, the mainmast is stepped on the keel, and the mizzenmast is stepped on the platform deck over the shaft alley. The fore and main masts, together with their yards, are identical. The EAGLE follows the rigging practices in large sailing ships at their final stage of development, the foremast and its topmast are really one hollow tube, as is the mainmast and its topmast. However, they are rigged as the older vessels were, that is the shrouds come in under the tops where a new system of topmast shrouds originates. The two parts of the masts retain their original names, that is foremast from the deck to the top and foretopmast from the top to the crosstrees, the same applies to the main. The topgallant and royal masts are each likewise really one hollow steel spar, but again the topgallant shrouds terminate about half way up the spar and the portion above the topgallant hounds is known as the royal mast. The following table gives the names and weights of the individual spars:



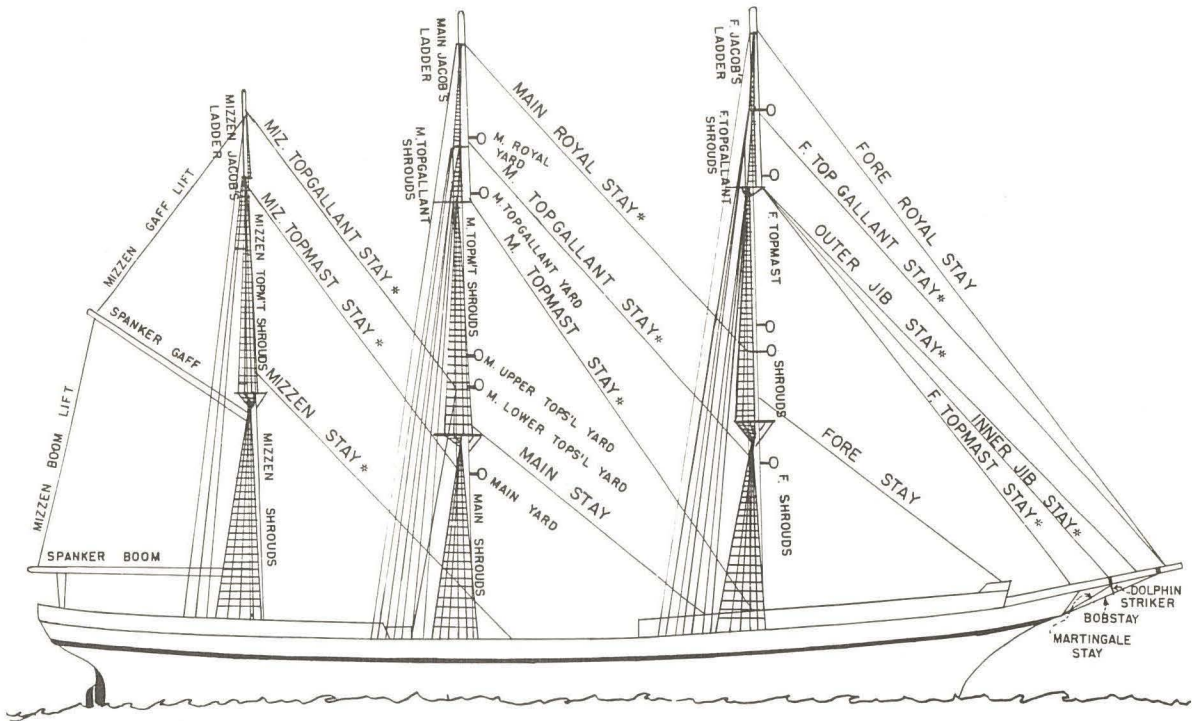
USCGC EAGLE

SECOND DECK



USCGC EAGLE

SPARS AND STANDING RIGGING



NOTES

1. Stays which are marked with an asterisk carry staysails or headsails.
2. Backstays, like headstays, are named for the part of the mast from which they lead.
3. Moveable yards (upper topsails, topgallants, and royals) are shown in their down positions, sails furled.
4. Fore and main topgallant masts can be "housed" to reduce masthead height. See appendix for procedure.

<u>NAME OF SPAR</u>	<u>LENGTH</u>	<u>WEIGHT</u>
Bowsprit	43 feet	7300 lbs.
Topgallant masts	52 feet	2128 lbs.
Fore & Main Yards	79 feet	6380 lbs.
Lower Topsail Yards	72 feet	4840 lbs.
Upper Topsail Yards	63 feet	3520 lbs.
Topgallant Yards	50 feet	1700 lbs.
Royal Yards	38 feet	884 lbs.
Mizzen Gaff	35 feet	994 lbs.
Mizzen Boom	54 feet	2200 lbs.

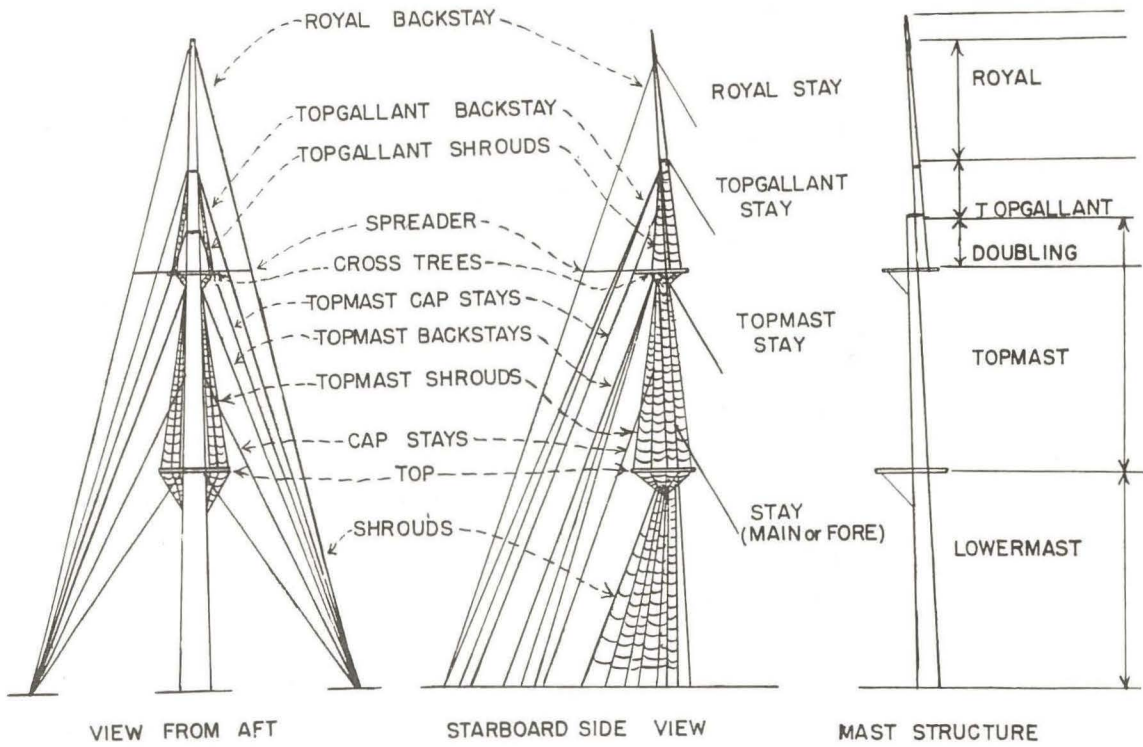
E. RIGGING

If you go aboard the EAGLE without previous study, and look aloft at what will undoubtedly appear to be a maze of complicated gear, you may well be inclined to give up before you start. However, if you will study the drawings which follow this page it will soon become apparent that there is a simple system if analyzed by component parts. The drawings are so arranged and separated as to enable you to understand this system. The naming of the various masts is simple, the yards and other spars take the names of the masts to which they are attached and logically enough each shroud, backstay, and stay takes the name of the mast which it supports. The sails take the names of the yards or stays on which they are set.

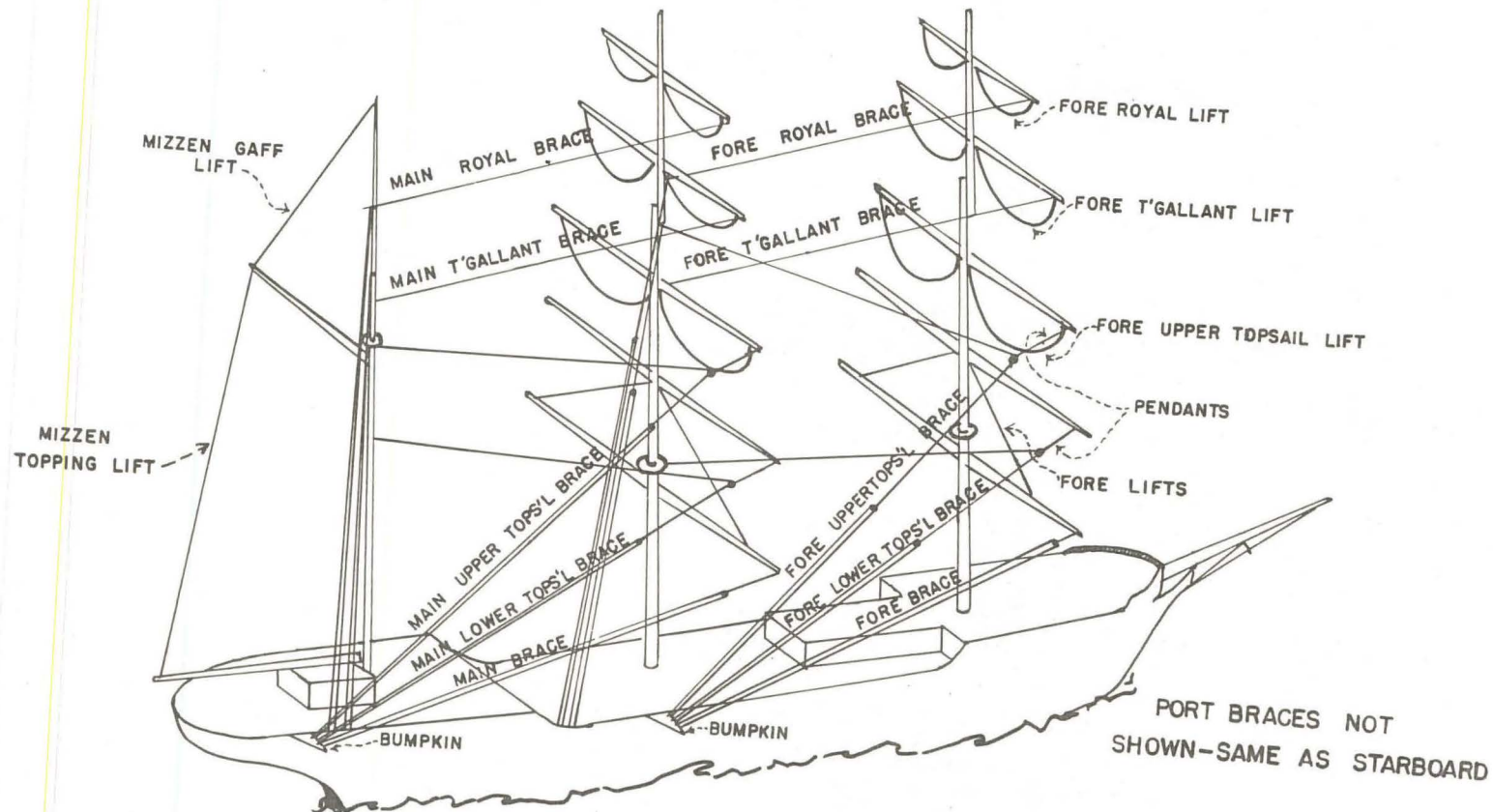
The running rigging is what really contributes density to the maze. However, it is again simple when understood. Each sail is controlled by certain lines, some of which are used to set the sail, some to trim it, and others to furl it. The clews, or lower corners, of a squaresail must be held down. This is done by lines known as sheets. On the upper sails these sheets run to the yardarm below. On the lower sails the sheets run directly to the hull and it is necessary to have other lines known as tacks. When the sails are set on the wind, the weather tack holds the forward clew of the sail and the lee sheet holds the other clew down and aft. The yards are swung by lines known as braces. Each brace takes the name of the yard it controls and may be called by starboard and port or by lee and weather as circumstances direct. The yards are held level or canted by means of lines known as lifts. These lifts are likewise known as starboard and port or lee and weather, and the name of the yard to which they are attached. If you examine the drawings you will notice that only the lifts on the lower yards are controlled by tackles. The lifts of the upper yards are "standing", to the furling position. When the sails are set the horizontal angle of all the yards is controlled by the lower lifts since the sails themselves tie the yards together.

Sails are furled by clewlines, leechlines, and buntlines. The clewlines work opposite the sheets and are used to haul the clews, or corners, of the sails up to the yards. The leechlines haul the sides, or leeches, of the sails up to the yards and the buntlines haul the middle and foot up to the yards.

STANDING RIGGING



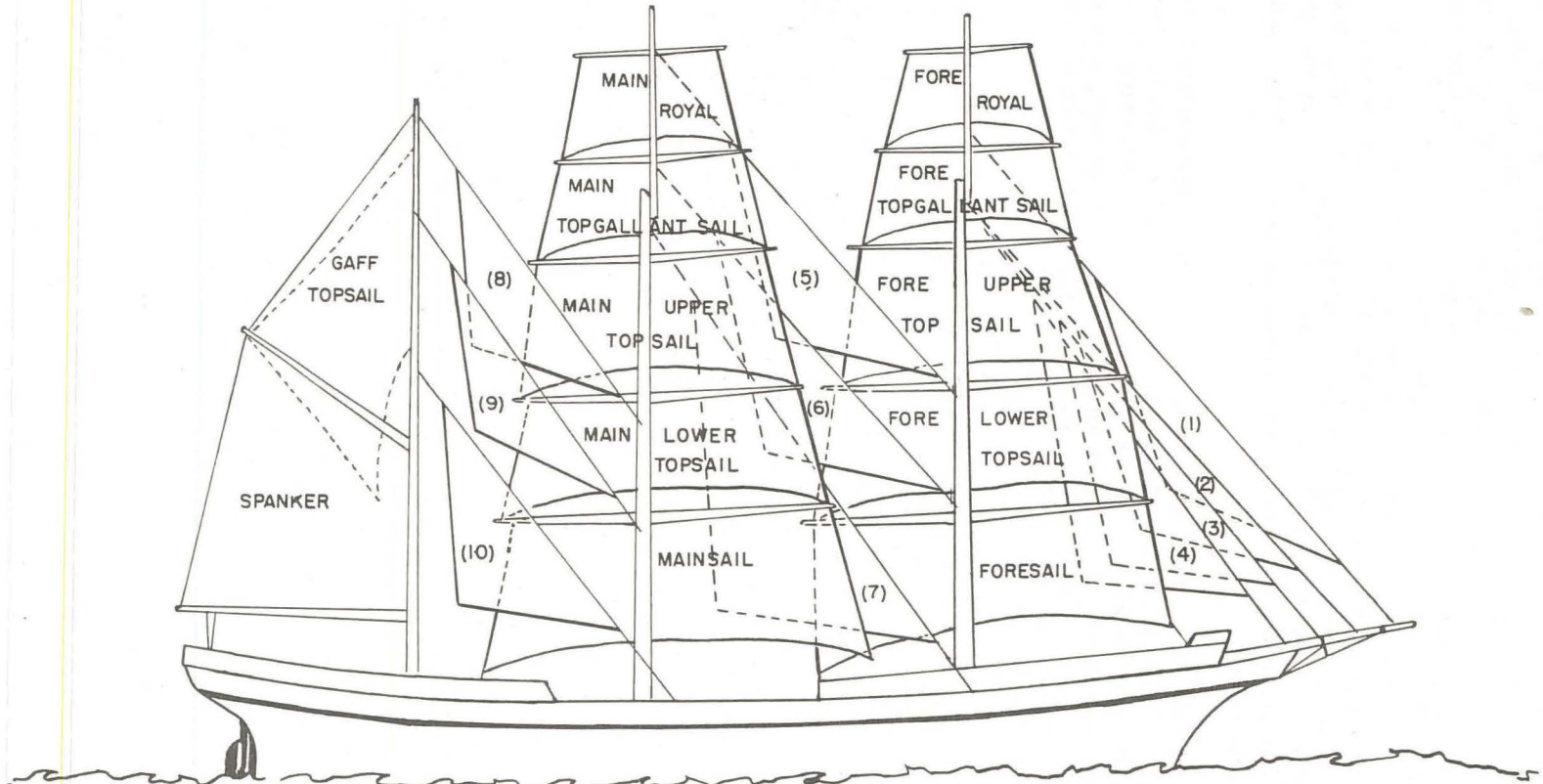
LIFTS AND BRACES



Halyards (a contraction of haulyard) are the most important pieces of running gear. Each halyard takes the name of the yard it hauls aloft. Generally speaking, the sails are set by letting go and overhauling the buntlines and leechlines, easing down clewlines, hauling down the sheets, and hoisting up the yard by means of the halyard. They are furled by lowering the yard, and by hauling up the sail with the clewlines, buntlines, and leechlines. It is thus possible to do ninety percent of the work of setting and furling the sails from the ship's deck. A study of the diagrams will enable you to follow the rigging of the ship. You will notice that there are some exceptions to the rules of names; specifically, the clewlines on the courses are clew-garnets. No one knows why—it is simply one of the facts of nautical life.

The description is in most general terms, the drawings are most specific if you study the drawings and look at the ship you will be able to understand what goes on the very first day you are aboard. If you are to be a useful member of the ship's company, not merely a burden on all and a danger to yourself, it is essential that you comprehend this rigging and learn the nomenclature as a Fourth Classman.

SAIL PLAN - USCGC EAGLE



(1) FLYING JIB

(2) OUTER JIB

(3) INNER JIB

(4) FORE TOPMAST STAYSAIL

(5) MAIN ROYAL STAYSAIL

(6) MAIN TOPGALLANT STAYSAIL

(7) MAIN TOPMAST STAYSAIL

(8) MIZZEN TOPGALLANT STAYSAIL

(9) MIZZEN TOPMAST STAYSAIL

(10) MIZZEN STAYSAIL

CHAPTER 2

SAILS

A. SQUARESAILS .

EAGLE has ten squaresails. Those on the foremast are exactly like those on the mainmast. Familiarity with one mast should automatically insure familiarity with the other, thus this discussion will concern itself with squaresails on the mainmast only.

The top edge (head) of each squaresail is attached to a yard. The sail takes the name of the yard to which it is attached and is below this yard when it is set. Reference to one or more of the sail and rigging diagrams will be quite necessary from this point on.

1. Setting squaresails - The mainsail and lower topsail set from "fixed" or "standing" yards. These yards do move, but are so called because they do not slide up or down the mast as others do. These two sails are quite simple to set. Essentially they are dropped from the yard and the two lower corners controlled or attached to keep the sail from slatting about and to make the sail draw. The actual operation involves a few more steps that bear some explanation and study. The buntlines and leechlines which previously have been used to hoist the sail up to the yard may have been slacked. It is mandatory to insure that these lines are set taut prior to attempting to set the sail. This can be done before sending men aloft or while they are going aloft, but it must be done prior to sending men out on the yard. If the buntlines and leechlines have been stopped off at the yoke or tye (near the center of the yard), they MUST be broken from the stops prior to sending men out on the yard. Failure to do so could result in serious injury to a person. Once the buntlines and leechlines are broken from their stops and set taut, men are sent out on the yard to remove the gaskets (short lines that hold the furled sail on the yard). On the command "LET FALL", the sail is pushed off the forward side of the yard. This command may be given by the mast captain or he may have directed the yard captain to give it. Once the sail is pushed off the yard, the yardmen lay in to the mast. Two men remain in at the mast and overhaul the buntlines and leechlines as needed. The remainder of the men will do as directed. After having been pushed off the yard, the sail is "in its gear". (See Diagram #1) Once the men are off the yard, and at the mast captains command, the buntlines and leechlines are thrown off their belaying pins and are allowed to run freely. The clewlines (clew garnets in the case of the mainsail) are eased smartly and the sail is sheeted home. (See Diagrams #1 and #2) You cannot throw off the clewlines as the chain links of the sheets, if allowed to drop, would most likely foul in the block on the yard below. The sails above the mainsail have a sheet in each corner and they sheet to the next lower yard. The mainsail has a sheet and a tack in each lower corner (tack). It will normally be necessary to haul taut the weather tack and the lee sheet to make the mainsail set properly.

Essentially what has been said for the lower topsail applies to the remaining three squaresails - with some additions. The additions are necessary because the upper three yards move up and down the mast on a movable track and are called

logically enough "movable yards". Before you attempt to move the yard aloft, consider what might hinder the movement of that yard. Take the upper topsail yard and note that the topgallant sail sheets render through blocks on the upper topsail yard. (See Diagram #6) Consider what would happen if the topgallant sheets were set taut and you attempted to hoist the upper topsail yard. It wouldn't be very long before there would be a great deal of binding of the topgallant sheets in their blocks and an excessive strain on the halyard. This must be understood before going farther.

To set a sail from a movable yard, it is loosed, let fall, and sheeted home as is the lower topsail. In addition it is necessary to hoist the yard aloft. The sheets for the next sail aloft are thrown off, (Do you remember why?) the buntlines, buntleechlines, and/or leechlines are thrown off, the clewlines eased, the sheets hauled home, and the halyard hauled smartly. In the beginning it is wise to sheet home and then hoist away. Later when the cadet crew gains proficiency, it will be possible to sheet home and hoist away simultaneously. It is imperative that the sheets be home and even before the yard is too high. An over eager crew (or too many) on the halyard could run the yard off the track, damage a sail, or part a halyard. The final stage of hoisting the yard must be accomplished slowly and done hand over hand. Just enough strain should be brought on the leeches of the sail to make them set taut.

There is one more matter that we have not yet considered. It will be necessary to do something to the braces when the yard is hoisted. As the yard goes aloft, the distance between the end of the yard and the point where the brace attaches to the ship (or mast) increases. If nothing is done to the braces they will come very taut causing a great deal of friction between the yard and the mast to say nothing of the great strain on the braces and halyard. One or both of the braces must be eased. In the case of the upper topsail both braces are eased eight feet if they were reasonably taut to begin with. This should insure that the yard will go straight up without either end cocking aft. In the case of the topgallant and royal yards it is desired that the weather end of the yard be slightly aft (braced in). More will be said about the reasons for this later. To accomplish this, only the lee brace need be eased when the yard is hoisted.

a. Squaresails are set in the following order:

Lower Topsail
Upper Topsail
Mainsail (Foresail)
Topgallant Sail
Royal Sail

2. Furling squaresails - Squaresails are taken in and furled in the reverse order of setting. The mainsail and the lower topsail are very easy to set and are also very easy to furl. Essentially the reverse procedure of setting is used. Buntlines, leechlines, and clewlines are manned and sheets (tacks also for the mainsail) are tended. The sheets (and tacks) are eased smartly and the sail is hoisted up to the yard by the buntlines, leechlines, and clewlines. On command, men lay aloft and furl the sail. These men can start aloft before the sail is up in its gear in

SQUARESAIL RUNNING RIGGING

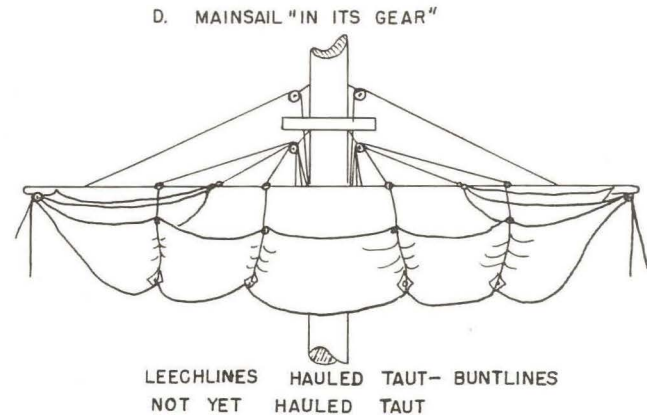
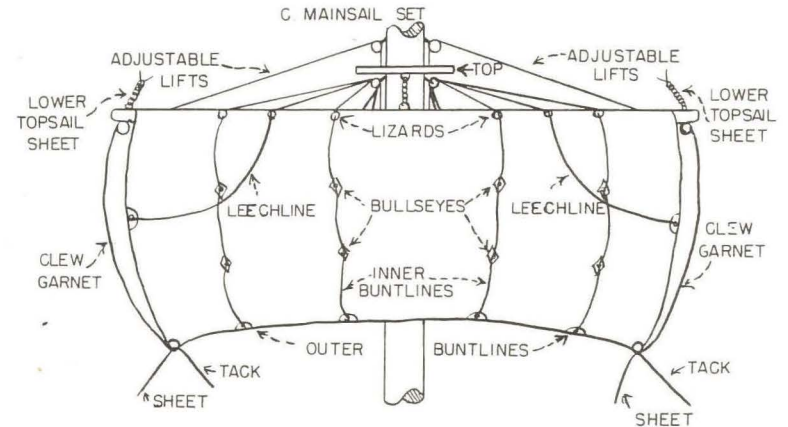
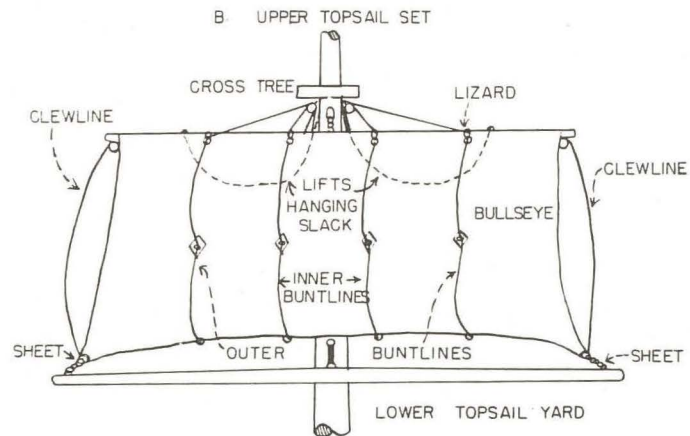
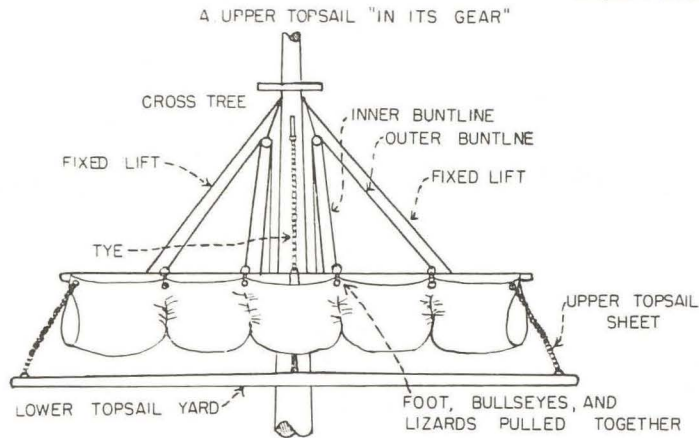


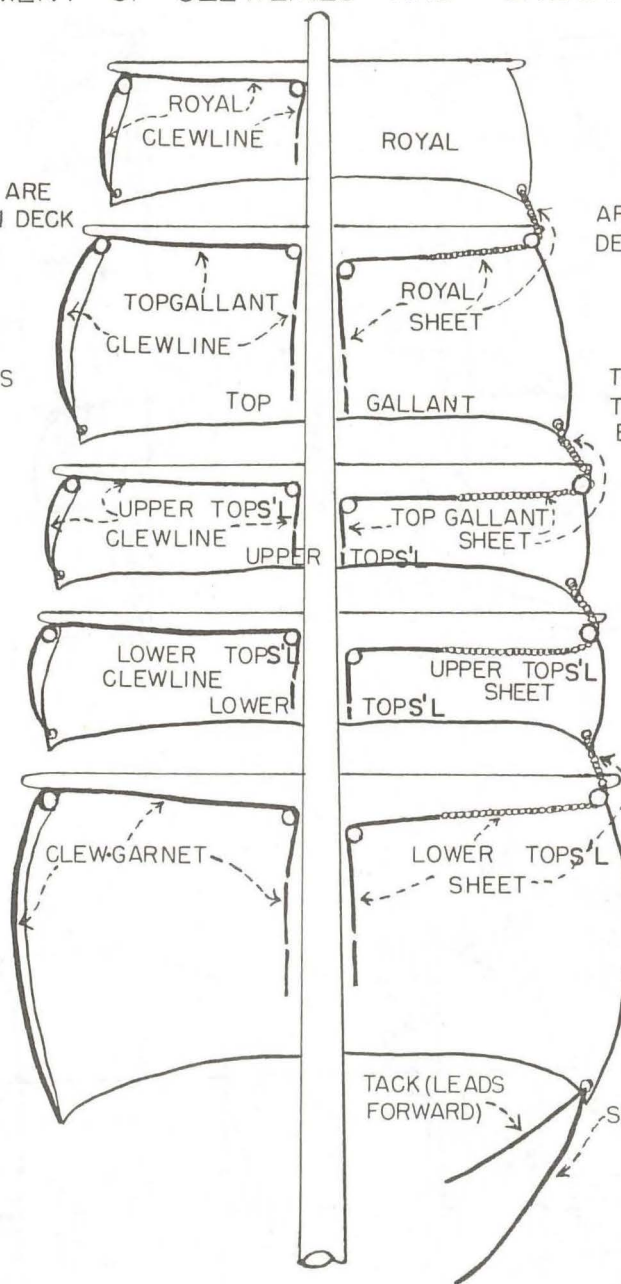
Diagram #1

ARRANGEMENT OF CLEWLINES AND SHEETS

CLEWLINES

ALL CLEWLINES ARE
HANDLED FROM ON DECK
AT THE PIN RAIL

CLEW-GARNET LEADS
TO FIFE RAIL



SHEETS

ALL SHEETS
ARE HANDLED FROM ON
DECK AT THE FIFE RAIL

THE PORTION OF
THE SHEET THAT GOES
THROUGH THE CHEEK
BLOCK IS MADE OF
CHAIN

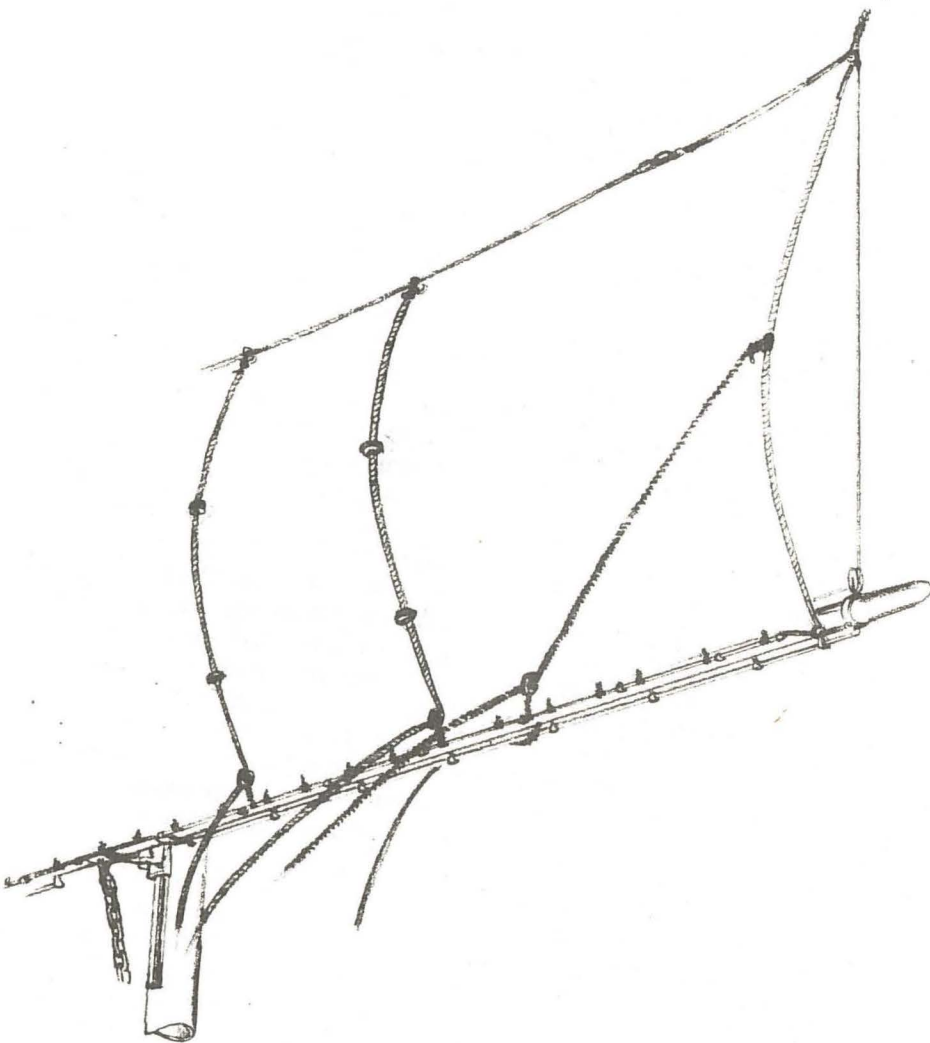
Diagram #2

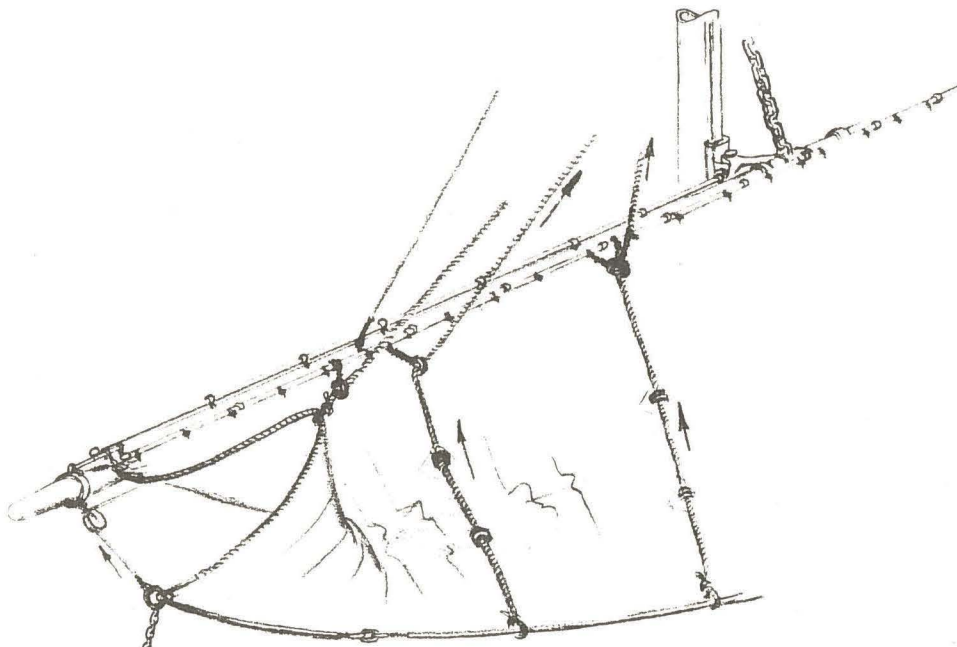
order that they may get out and start furling just as soon as it is possible. The first men always go out on the weather yardarm and start smothering canvas. The following drawings illustrate the proper method of furling a squaresail. The one thing that can make a big difference between a proper furl and a twisted mess of canvas is the handling of the leech of the sail. It must be drawn up to the yard, stretched flat, and held on the yard until just before the last bight of sail is taken. It must not be allowed to drop until the foot is dropped.

As it is necessary to hoist the yard to set the sail on a movable yard, so is it necessary to lower the yard before you actually furl the sail. It was necessary to ease the sheet of the sail next above when hoisting the yard and it is necessary to do the same before lowering. If the halyard is eased the yard might start down the track and it might not. If the sail is full of wind, the yard will tend to move forward from the mast and cause a great amount of friction between the shoe and the track. This pressure and friction may be greater than the weight of the yard can overcome. We do not wait and see if the yard will fail to start down due to possible binding, but rather assume that it always will bind and follow a procedure that will aid gravity in getting the yard down to its "settled" position. Observe that if the sheet of a sail being taken in is left belayed and a strain is taken on the clewline, a force is exerted on the yard tending to pull it down. When the halyard is eased and this procedure is carried out, the yard will slide down until it settles into its lifts. This is called "clewing down". Buntlines, leechlines and clewlines are manned. Sheets, halyard and lee brace are tended. On the command "CLEW DOWN", the halyard is eased and the clewlines hauled smartly. The lee brace is rounded in as it comes slack. The sheets of the sail next above have been slacked. NO OTHER lines are hauled. When the yard settles in its lifts -- and not until -- the command "CLEW UP", is given. Sheets are slacked and buntlines, leechlines, and clewlines are hauled. The sail comes up to the yard. The actual furling of the squaresails on movable yards is done exactly as it is done on the fixed yards.

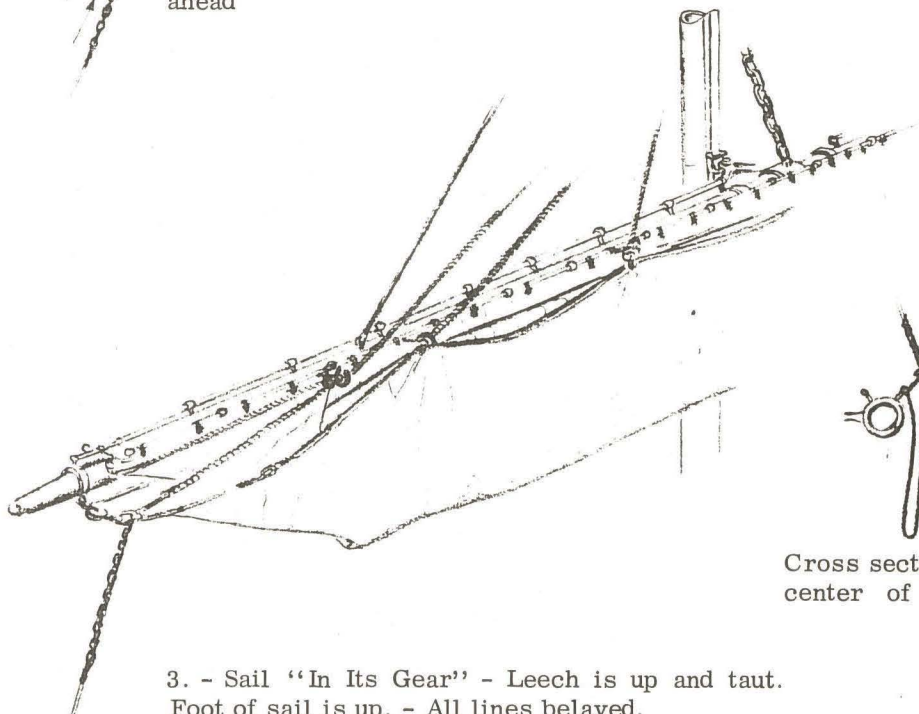
After furling all sail it will probably be necessary to trim up the braces and remove the cockbill from either or both of the lower two yards. The removal of the cockbill is done by first bringing the lower topsail yard parallel to the main yard with sheets alone. Once this is done, the two yards are brought parallel with the upper topsail yard by using the main lifts.

1. - Main Topgallant Sail Set



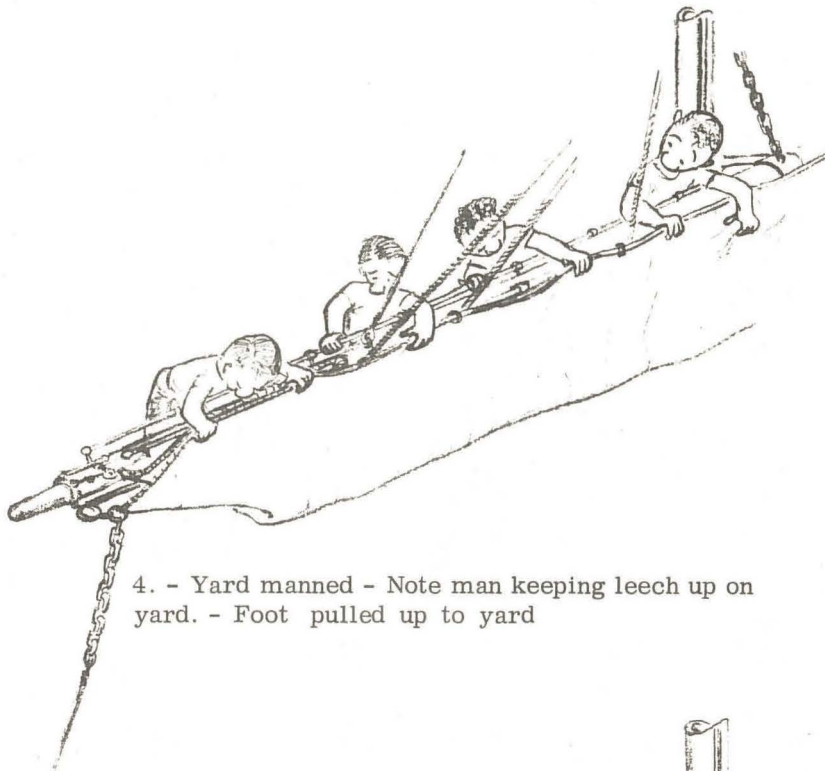


2. - "Clew up" (after Clewing Down) leechlines, buntlines, and clewlines coming up. Note leech ahead

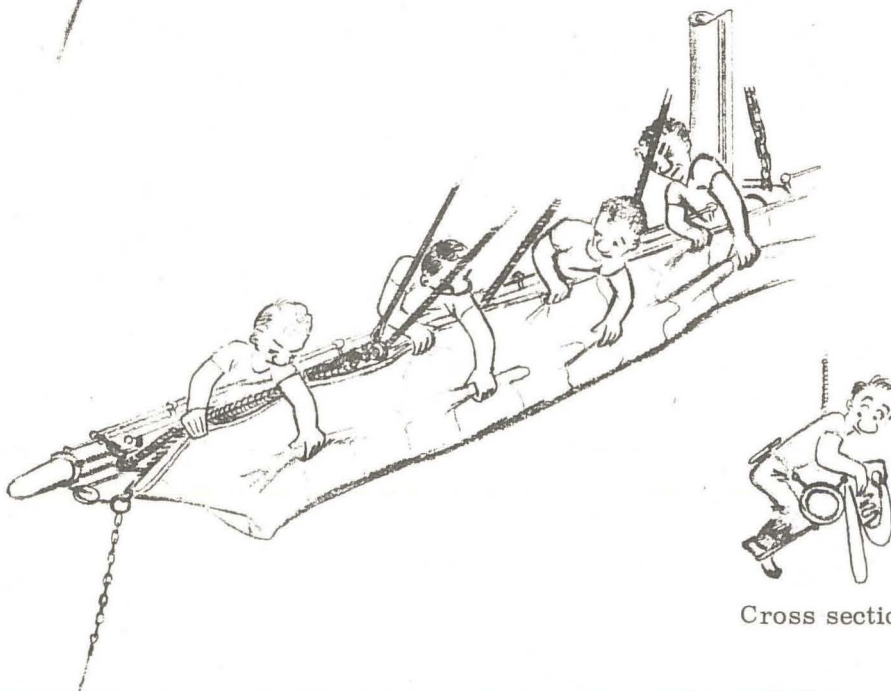


Cross section at center of yard

3. - Sail "In Its Gear" - Leech is up and taut. Foot of sail is up. - All lines belayed.

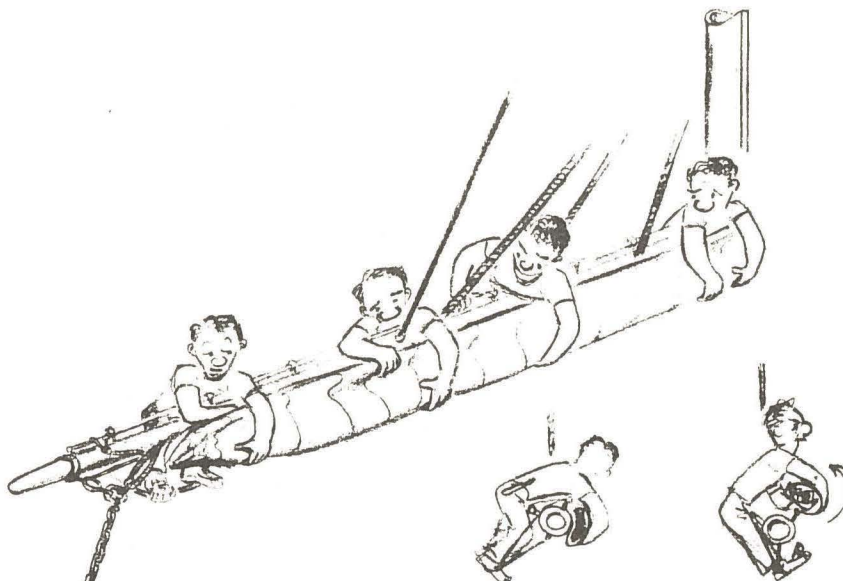


4. - Yard manned - Note man keeping leech up on yard. - Foot pulled up to yard



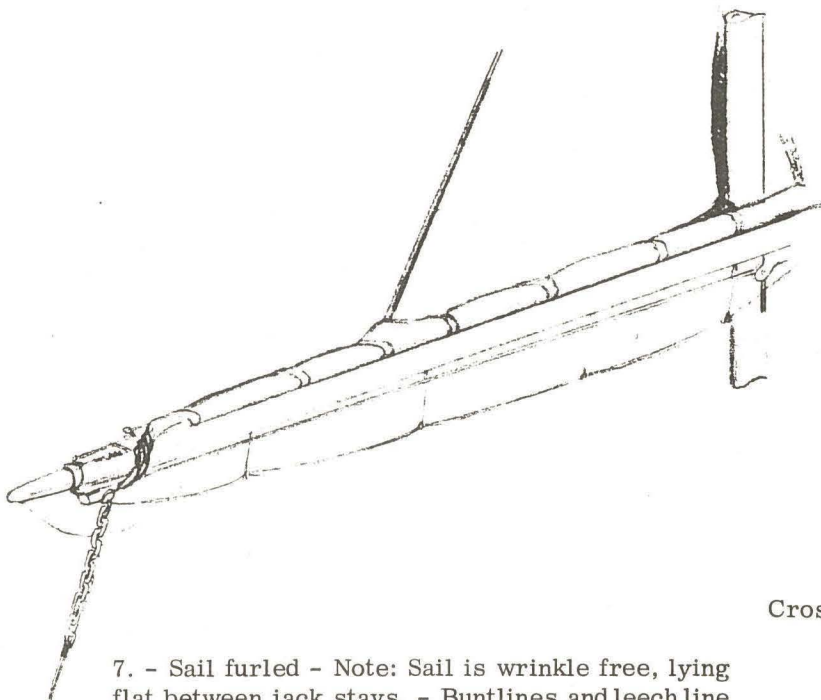
Cross section

5. - Furling - Men must keep together, lifting each bight uniformly. - Outboard man continues to keep leech up on yard.



Cross section (1) Cross section (2)

6. - Sail almost furled - Drop each bight in to the following bight until a tight skin is attained. Drop leech and foot just before last bight is taken. Roll skin up on yard.



Cross section

7. - Sail furled - Note: Sail is wrinkle free, lying flat between jack stays. - Buntlines and leech line stopped off near mast.

B. HEADSAILS AND STAYSAILS

EAGLE has four headsails and six staysails. All are similar in shape and operation. For this reason, this discussion will concern itself with one sail only.

1. General - Each staysail and headsail has a halyard, a downhaul, and a sheet (headsails have two sheets). The halyard and the downhaul oppose one another as their purpose is opposite. They remain rigged all the time. Sheets for the headsails remain rigged and on their respective sides of the forecandle. Sheets for the staysails are stowed in the crosstrees, in the tops, or on deck and must be rigged on the proper side each time the sail is to be set.

2. Setting - The gaskets securing the furled sail are cleared away and the sheet rigged and led free on the proper (lee) side. The downhaul is laid out free for running and tended by one man. The halyard and sheet are manned. The halyard is hauled smartly (run away with) and the downhaul is allowed to run freely. A light strain is taken on the sheet to keep the sail from slatting about and tearing itself apart. Too much strain will result in the hanks binding on the stay and undue strain on some of the seams. Too little strain on the sheet will result in a torn sail in a brisk wind. When the sail is nearly close up the halyard is hauled hand over hand to insure that an abrupt and severe strain does not come on the bolt-rope. When the halyard is belayed the sheet is trimmed. Remember that a square rigged vessel cannot lie as close to the wind as a fore-and-after. For this reason it is not necessary to sheet the staysails in tight.

3. Furling - The first process in furling a sail is taking it in. Essentially the reverse procedure of setting is used. The sheet and halyard are made ready for running and are tended. The downhaul is manned. The halyard is slacked and the men run away with the downhaul. The sheet is first eased and then slacked. As the downhaul is attached to the clew and then led through a lizard at the head of the sail, a strain on the downhaul will cause the clew to travel up to the head of the sail. When this happens, the sheet is allowed to run as it will no longer exert any control on the sail. If the halyard were allowed to run freely it can readily be seen that the clew would not be made to rise to the head of the sail until after the sail was completely down, and only if you were lucky then as the downhaul would probably be fouled. The man on the halyard must glance at the clew of the sail to see if it remains hauled up next to the head. If it does not, he is slacking the halyard too fast. On the other hand he is not to be miserly as his shipmates are pulling on an opposing line to get the sail down. Diagram #4 will illustrate the stages of taking in and furling a staysail. Note that the miter seam of a properly furled staysail hangs straight down the after side of the sail.

STAYSAIL NOMENCLATURE

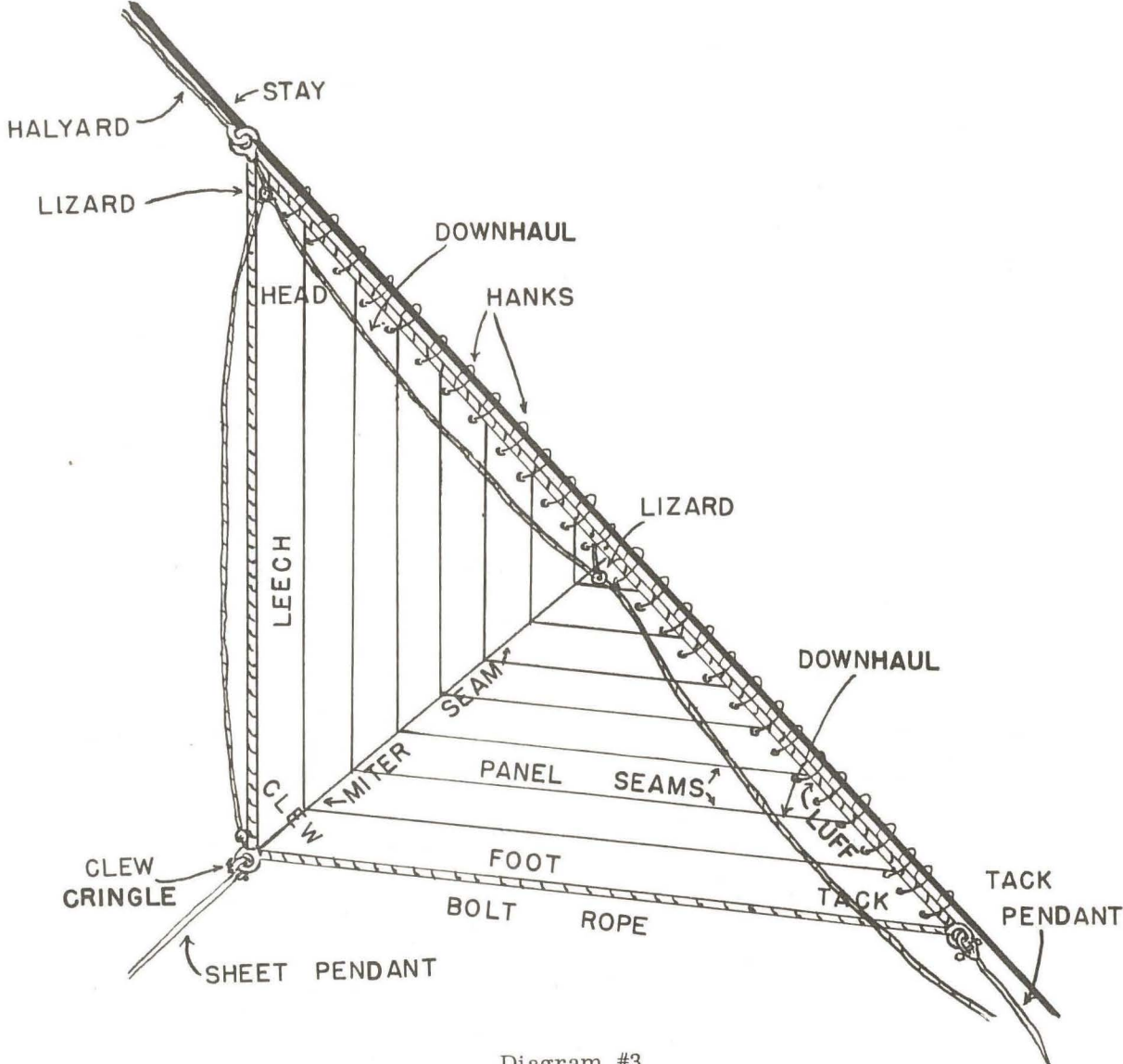


Diagram #3

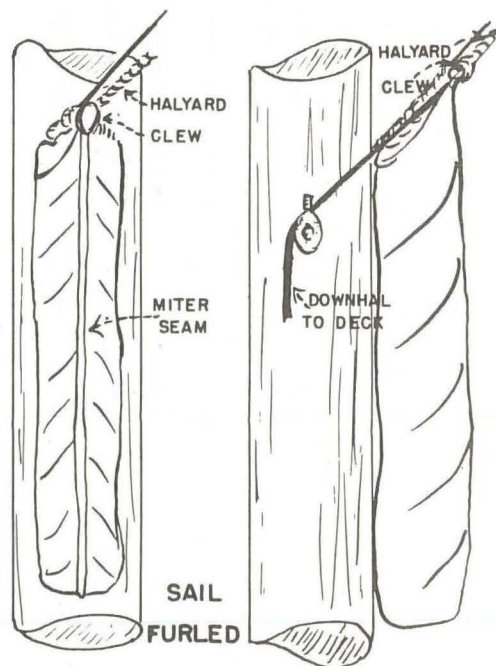
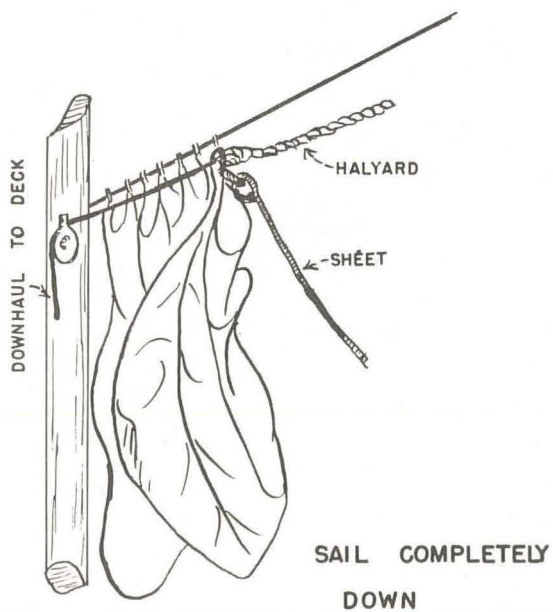
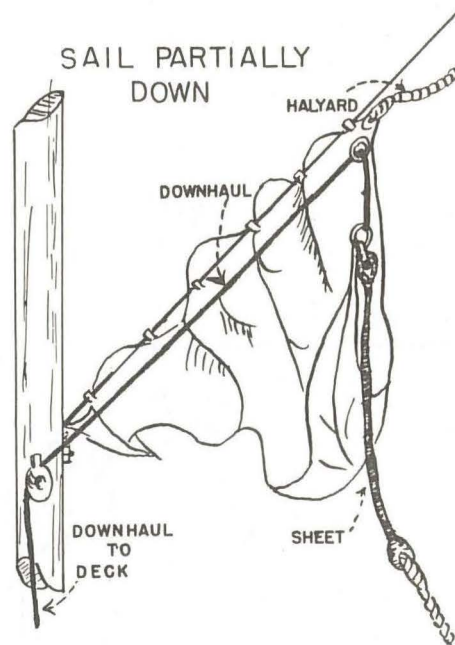
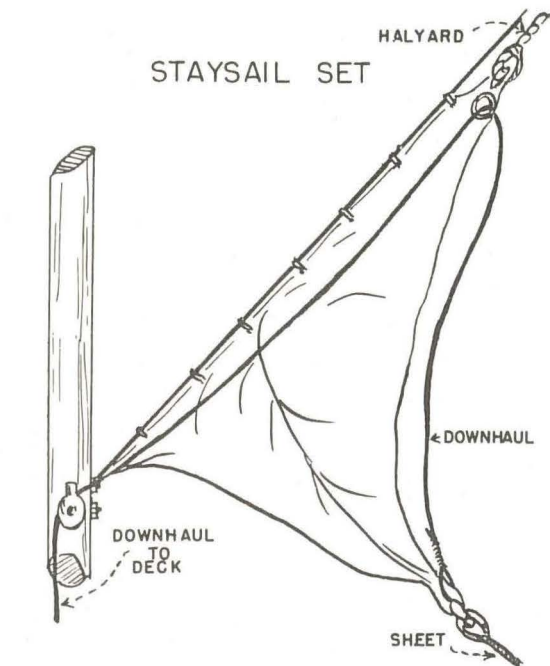


Diagram #4

C. SPANKER AND GAFF TOPSAIL

1. Spanker - The spanker is a large gaff-headed sail that sets from the mizzen mast. It provides a drawing or driving power for the vessel, but often it is more important for its balancing effect. It is well aft of the pivot point of the vessel so it has a considerable moment.

a. Setting the spanker - The spanker boom is hauled to the appropriate side depending on the tack to be sailed. This is accomplished by slacking the sheet and hauling on the preventer tackle rigged on the lee side. The boom is topped up by the use of the topping lift. The weather vang is slacked as is the weather flag halyard. The next step is perhaps the most important. **INSURE THAT THE RADIO TRANSMITTERS ARE SECURED BEFORE SENDING MEN ALOFT.** Several men are sent aloft to clear away the gaskets and one or more remain on the cranelines as the sail is set to overhaul the brails. The brails, foot inhaul, and peak inhaul are laid out free for running and tended. The foot outhaul and peak outhaul are manned. Both outhauls are hauled as the other lines are slacked. The head and foot of the sail are hauled out until the scallops in the boltrope along the head and foot are removed. Care must be taken not to foul the flag halyard. Once the sail is set it may be necessary to ease the topping lift to insure the proper shape in the leech of the sail. The full weight of the boom must not be born by the sail so there is always a strain on the topping lift. Any excessive slack remaining in the vangs must be trimmed in but they are not to be set taut. Remember that the vangs only control the gaff when the sails are NOT set.

b. Taking in the spanker - Taking in and furling the spanker is almost the exact reverse of setting the sail. The boom is topped up to insure that the slides will not bind on the tracks. The outhauls are led free for running and the brails and inhauls are manned. When all is in readiness the outhauls are cast off and allowed to run free. The inhauls and brails are hauled until the sail is up snug against the mast. The greater effort should be expended on the lee brails as these will better spill the wind. Care must be taken to keep both halves of the brails fairly even though. It should be seen that the function of the brails is essentially the same as the buntlines of a squaresail. When the sail is in, the boom is hauled amidships as is the gaff. Now the vangs are set taut to prevent the gaff from thrashing about. **BEFORE MEN GO ALOFT TO FURL THE SAIL, INSURE THAT THE RADIO TRANSMITTERS ARE SECURED.** The sail is furled by smoothing the canvas into a neat cylinder and passing the gaskets. (After everyone is down from aloft inform the radioman and the OOD.)

2. Gaff topsail - The gaff topsail should be considered to be very similar to a staysail. It does in fact have hanks that slide on a jackstay on the after side of the mizzen mast. The sail has a halyard, a sheet, a clewline, and a tack. The halyard performs the same function as a halyard on a staysail. The sheet is attached to the clew of the sail and controls that corner of the sail as does the sheet on a staysail. The clewline also attaches to the clew of the sail and acts like the downhaul of a staysail, or if you consider it in the broader sense, like the clewline on a squaresail. The tack is a line attached to the tack of the sail. It is a pendant or a "leader" that leads the long tack section of the sail down the proper (lee) side of the spanker.

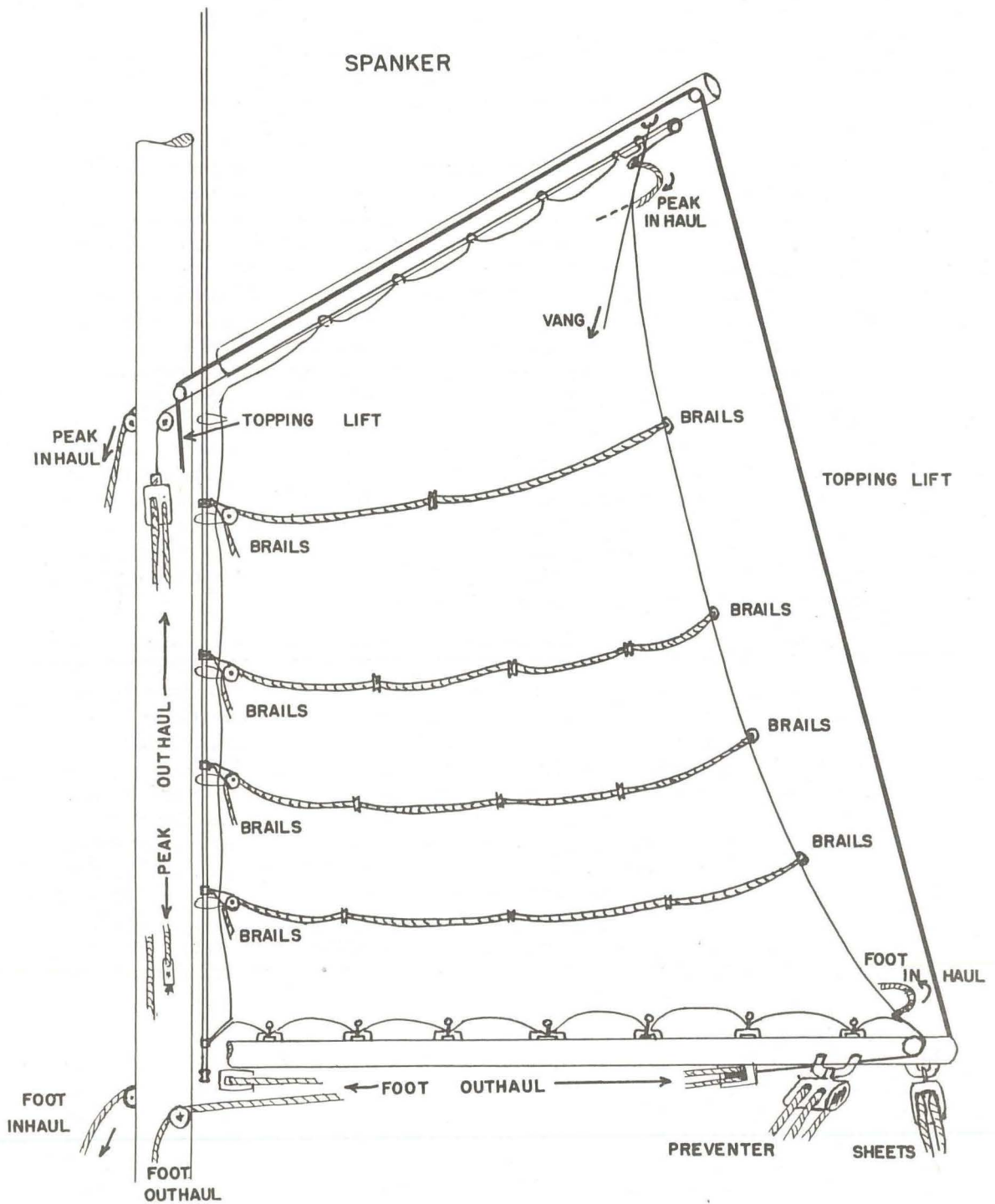
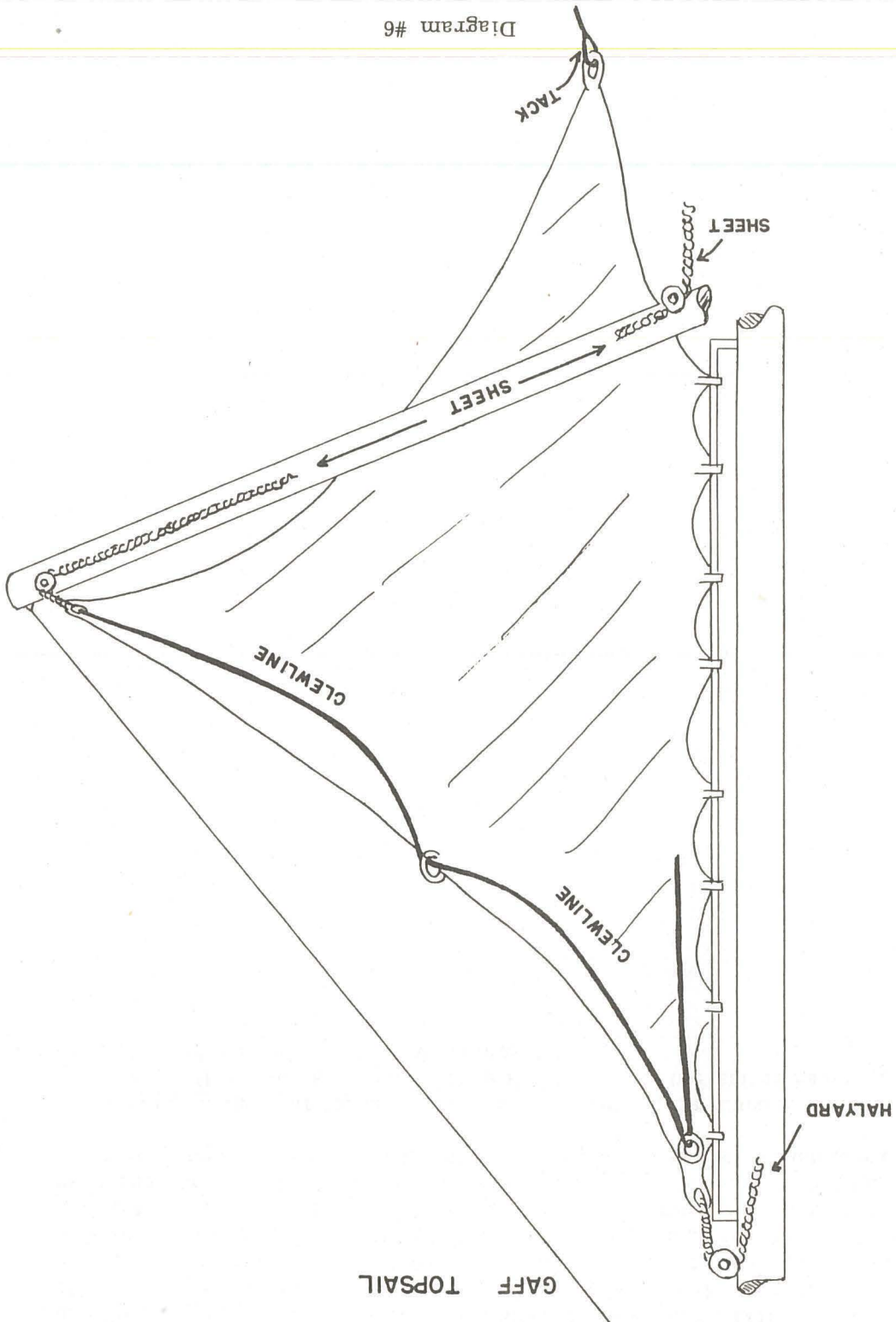


Diagram #5

- a. Setting the gaff topsail - BEFORE SENDING ANYONE ALOFT ON THE MIZZEN, INSURE THAT THE RADIO TRANSMITTERS ARE SECURED. One, or at most two men are sent aloft to clear away the gaskets and to lower the tack on the proper side. The halyard and sheet are manned and the clewline laid out clear for running. The clewline is allowed to run freely as the halyard and sheet are hauled home. Sufficient strain must be taken on the tack to insure a decent set in the sail and to insure that it does not thrash about.
- b. Taking in the gaff topsail - Exactly the reverse procedure is used for taking the sail in as was used for setting it. The tack of the sail is hauled up to the top and the sail is furled like a staysail.

Diagram #6



D. LIFTS

In Diagram #7 the lift blocks are at A and C at the sides of the mast about 12 feet above the main (fore) yard. When the yard is square, the distances AB and CD are equal. When the yard is braced up the distance from point A to where the lift attaches to the yard increases on the weather yardarm. The distance CD decreases on the lee yardarm. These new distances are represented as AB' and CD'. If the lifts were elastic they would assume these new lengths and the yard would remain parallel to the deck. The lifts are not elastic and as a result when the yard is turned the weather yardarm rises and the lee yardarm is allowed to dip. This is called cockbill. It is due to the fact that the center of rotation of the yard is forward of the center of the mast (the plane of the lift blocks on the mast).

To overcome this cockbill you must make some adjustment to the lifts when bracing the yards. It is very easy to do when the yards are moving and quite difficult to do after the bracing has been completed.

The rule is to slack the lee lift and haul on the opposite ("new lee") lift as the yards come around. In Diagram #7 the port yardarm is the lee yardarm. Note that if the yard were to be braced to the opposite tack it would be necessary to slack the port lift and haul on the starboard lift.

This discussion concerned only the main (fore) yard as it is the only yard with movable lifts. The yards with fixed lifts will always cockbill slightly when the sails are furled (yards in their settled position) and the yards are braced up as there is no way to adjust fixed lifts.

The buntlines, leechlines, and clewlines experience the same phenomenon as the main (fore) lifts. When the yards are to be braced, it is necessary to slack all buntlines, leechlines, and clewlines on the leepinrail. Failure to do this when the sails are set will necessitate men going aloft after the yards are braced to overhaul all the gear that has come taut. Failure to do this when the sails are furled will at least result in pulling the furl out of shape and will probably result in bullseyes being pulled out and the sails being damaged.

When squaresails are set, it is desired to keep the yards parallel to the wind (parallel to the water). If the main (fore) yard is kept parallel to the water, all yards with sail set will remain parallel to the water as they are all tied to the main (fore) yard through the leeches of the sails and operate essentially as parallelograms.

BRACING OF YARDARM - EFFECT
UPON LIFTS

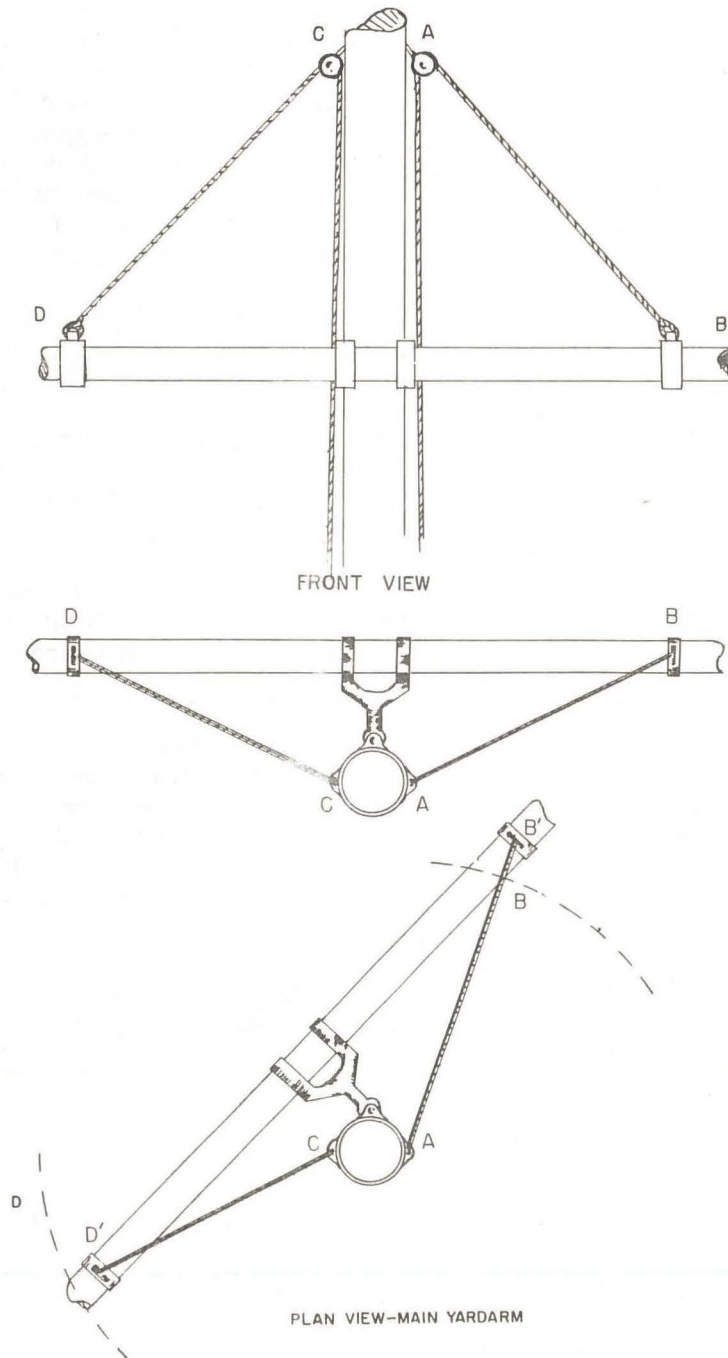


Diagram #7

E. TRIMMING SAIL

1. Fore and aft sails - Fore and aft sails are trimmed by their sheets. The closer to the wind the vessel is sailing, the further in these sails must be trimmed. Remember to trim them only flat enough to remove the luffing from the sail. (To balance the vessel it may at times be required to trim the headsails a bit flatter and even to ease the mizzen staysails and spanker to the point where they are allowed to luff just the slightest bit. This is only done when sailing close hauled and is done to overcome the necessity to carry rudder to keep the vessel on course.) In trimming fore and aft sail, the rule to follow is ease the sail until it begins to luff and then trim it in a bit until it stops luffing. When the wind is aft, do not confuse the spilling of wind and slatting of the sail with luffing.

2. Squaresails - The squaresails are trimmed by braces. (The courses are also trimmed by sheets and tacks.) When sailing as close to the wind as possible the yards are to be BRACED UP so that the lee yardarm is just touching the backstays BUT no strain is to be brought on the backstays. As the wind draws aft the yards are BRACED IN. When the wind is dead aft the yards are BRACED SQUARE.

It may often be necessary to brace the yards even though the sails are not set. When under power always keep the yards braced so that they present the least resistance to the wind. This is especially important when the wind is right ahead and can make as much as half a knot difference in the speed. It should also be noted that if the yards are trimmed to present the least resistance to the wind, they are also braced in such a fashion that the vessel could sail with a minimum change of course should there be an engine failure.

When bracing yards with the sails furled particular care must be exercised to slack all the gear on the pinrails. (Clewlines are only eased) If this is not done, the buntlines, leechlines, and clewlines on one side will come very taut and may pull out bullseyes, lizards, and tear the sails.

F. BRACING

Almost every line aboard EAGLE has an opposing line. Braces are no exception. To haul on one brace requires that the brace of the same name on the opposite side be eased or slacked. In the case of the courses, the braces are opposed also by the sheets and tacks. These must be tended when bracing fore and main yards. A man tending a line that is being eased or slacked must understand why that line is being eased or slacked and what is taking up the slack (shipmates on the other side).

When bracing the yards only a small amount, stand under the yardarm and decide how far you want the end of the yard to move. Multiply this distance by the purchase on the brace. Order the brace on one side slacked by that amount and the brace on the other side hauled taut. Until one gains experience it is better to do this in steps rather than run the risk of having to see-saw back and forth. Persons slacking or easing braces are not to be miserly with the line. Remember that if you ease it grudgingly, someone on the other side has to exert extra effort.

Note that the purchase on the braces is not the same for all yards. Ten feet hauled on the topgallant or royal brace will move the end of the yard five feet. Ten feet hauled on the upper topsail brace will move the end of the yard only two and a half feet. When changing from one tack to the other and all braces are hauled, it is necessary to insure that the yards remain together. Due to the different purchases, the topgallant and royal yards will always tend to get ahead and must be slowed down ("easy on the royal and/or topgallant").

Once the new manila braces have stretched they are normally marked with leather strips to mark the square and braced up positions. If this mark is held at the belaying pin and the brace on the opposite side hauled taut the yard will be properly positioned (or require only a minimum adjustment). If lee braces are eased properly, the wind will move the yards and all the men on the opposite side have to do is haul in the slack. Men who are easing or slacking lee braces are not to be miserly with their line. If they are, they are causing extra work. When ordered to let the braces run to their marks -- let them run to the marks BUT NOT BEYOND. In the older days of sail one man let several braces run to their marks, belayed them, and ran to the opposite side to help haul in the slack.

Do not let the braces run past the marks. If this happens, the wind can catch the sail and slam the yard against the backstays and possibly even wring the yard off the mast.

A person who understands what he is doing on the braces can be an asset to the team. One who doesn't know what he is doing will cause a lot of extra work and can be quite dangerous.

G. RULES FOR WORKING ALOFT

1. Take no unnecessary chances and avoid grandstanding.
2. One hand for yourself and one for the ship. You have four points of contact with the rigging, two hands and two feet. Always keep three of these points in firm contact with part of the standing rigging; be sure never to support yourself from running rigging such as clewlines, buntlines, or other gear which may come slack.
3. Ratlines are light and sometimes carry away, shrouds and backstays never do, consequently, when going aloft always keep your hands on the shrouds and use the ratlines only for your feet. Climb one ratline at a time.
4. When laying out on the yard, use the jackstay for your hands, never trust yourself to gaskets or bights of the sail.
5. Never stand on the yard unless ordered to. Use the flemish horses on the yardarms. Special circumstances may, at sometime, require you to straddle a yard or even stand on it; when this is necessary, be sure that you do it after carefully thinking what will happen if the sail suddenly fills or shakes. Always remember that a very small puff of wind in a sail is quite capable of throwing you entirely out of the rigging if you are sitting on the sail.
6. Never get on the lee side of a sail while working on the bowsprit.
7. Always use the weather shrouds when going, or coming down from, aloft. (Either side may be used when wind is fore and aft.)

H. ORDERS FOR SETTING INDIVIDUAL SAILS

1. To set a lower topsail:

YARDMEN LAY ALOFT AND LOOSE THE FORE (MAIN) LOWER TOPSAIL.
MAN THE FORE (MAIN) LOWER TOPSAIL SHEETS.
LET FALL, LAY IN AND OVERHAUL GEAR.
THROW OFF THE BUNTLINES, EASE THE CLEWLINES.
SHEET HOME AND BELAY.

2. To set an upper topsail:

YARDMAN LAY ALOFT AND LOOSE THE FORE (MAIN) UPPER TOPSAIL.
MAN THE FORE (MAIN) UPPER TOPSAIL SHEETS AND HALYARD. TEND
THE LEE BRACE LET FALL, LAY IN AND OVERHAUL GEAR
THROW OFF THE BUNTLINES, EASE THE CLEWLINES, THROW OFF THE
TOPGALLANT SHEETS, SHEET HOME AND BELAY
RUN AWAY (THEN HAND OVER HAND) WITH THE UPPER TOPSAIL HAL-
YARD, EASE THE LEE BRACE.

3. To set a topgallant sail:

YARDMEN LAY ALOFT AND LOOSE THE FORE (MAIN) T^oGANTSAIL
MAN THE FORE (MAIN) T^oGANTSAIL SHEETS AND HALYARD. TEND THE
LEE BRACE LET FALL, LAY IN AND OVERHAUL GEAR
THROW OFF THE BUNTLINES, EASE THE CLEWLINES, THROW OFF THE
ROYAL SHEETS, SHEET HOME AND BELAY
RUN AWAY (THEN HAND OVER HAND) WITH THE T^oGALLANT HALYARD.
EASE THE LEE BRACE.

4. To set a royal sail:

YARDMAN LAY ALOFT AND LOOSE THE FORE (MAIN) ROYAL
MAN THE FORE (MAIN) ROYAL SHEETS AND HALYARD. TEND THE LEE
BRACE LET FALL, LAY IN AND OVERHAUL GEAR
THROW OFF THE BUNTLINES, EASE THE CLEWLINES
SHEET HOME AND BELAY
RUN AWAY (THEN HAND OVER HAND) WITH THE ROYAL HALYARD. EASE
THE LEE BRACE.

5. To set courses (braced up):

YARDMAN LAY ALOFT AND LOOSE THE FORESAIL (MAINSAIL)
MAN THE FORE (MAIN) WEATHER TACK AND LEE SHEET, TEND THE
LEE TACK AND WEATHER SHEET LET FALL, LAY IN AND OVERHAUL
GEAR
THROW OFF THE BUNTLINES AND LEECHLINES, EASE THE CLEW-
GARNETS
EASE THE WEATHER LIFT AND BOARD THE TACK
HAUL AFT THE LEE SHEET.

(When not braced up man both sheets, then let fall and sheet home.)

6. To set the spanker:

INSURE THAT THE RADIO TRANSMITTERS ARE SECURED BEFORE SENDING MEN ALOFT.

TEND THE SPANKER SHEET. RIG THE PREVENTER. HAUL THE SPANKER BOOM TO PORT (STARBOARD). SLACK THE WEATHER VANG. TOP THE BOOM.

LAY ALOFT AND CLEAR AWAY THE SPANKER

When the sail is loosed:

LAY IN AND OVERHAUL THE BRAILS

SLACK THE INHAULS, SLACK THE BRAILS, HAUL AWAY ON THE OUT-HAULS (Avoid fouling the colors)

If necessary after the sail is set:

EASE THE TOPPING LIFT

ROUND IN THE SLACK IN THE VANGS

7. To set the gaff topsail:

INSURE THAT THE RADIO TRANSMITTERS ARE SECURED BEFORE SENDING MEN ALOFT.

LAY ALOFT AND CLEAR AWAY THE GAFF TOPSAIL

MAN THE GAFF TOPSAIL SHEET AND HALYARD

TEND THE GAFF TOPSAIL CLEWLINE

SLACK THE CLEWLINE, HAUL AWAY ON THE HALYARD, SHEET HOME. SECURE THE TACK

8. To set a staysail or headsail:

LAY OUT (OR ALOFT) AND CLEAR AWAY THE _____
MAN THE _____ HALYARD (insert name of sail)

CLEAR AWAY AND TEND THE DOWNHAUL

TEND THE SHEET(S)

RUN AWAY WITH THE _____ HALYARD (Hand over hand the last few feet) SHEET HOME

I. ORDERS FOR TAKING IN SAIL

1. To take in a royal:

MAN THE FORE (MAIN) ROYAL CLEWLINES AND BUNTLINES

TEND THE SHEETS, HALYARD AND LEE BRACE

EASE THE HALYARD

CLEW DOWN, ROUND IN THE LEE BRACE

When the yard is in the lifts,

CLEW UP (The sheets are thrown off and the buntlines hauled in addition to the clewlines)

BELAY

2. To take in a topgallant sail:

MAN THE FORE (MAIN) TOPGALLANT CLEWLINES AND BUNTLINES
TEND THE SHEETS, HALYARD, AND LEE BRACE. THROW OFF THE
ROYAL SHEETS

EASE THE HALYARD

CLEW DOWN, ROUND IN THE LEE BRACE

When the yard is in the lifts,

CLEW UP (The sheets are thrown off and the buntlines hauled in addition to
the clewlines)

BELAY

3. To take in an upper topsail:

MAN THE FORE (MAIN) UPPER TOPSAIL BUNTLINES AND CLEWLINES
TEND THE SHEETS, HALYARD, AND LEE BRACE. THROW OFF THE TOP-
GALLANT SHEETS

EASE THE HALYARD

CLEW DOWN, ROUND IN THE LEE BRACE

When the yard is in the lifts,

CLEW UP (The sheets are thrown off and the buntlines hauled in addition to
the clewlines)

BELAY

4. To take in courses:

MAN THE FORE (MAIN) CLEW GARNETS, BUNTLINES AND LEECHLINES.
TEND THE TACKS AND SHEETS

SET TAUT BOTH LIFTS AND BELAY

CLEAR AWAY THE TACK JIGGER

SLACK TACKS AND SHEETS, CLEW UP (The alternative command 'Rise
tacks and sheets' may be used)

BELAY

5. To take in a lower topsail:

MAN THE FORE (MAIN) LOWER TOPSAIL CLEWLINES AND BUNTLINES
THROW OFF THE SHEETS AND CLEW UP

BELAY

6. To take in a jib or staysail:

LEAD OUT AND MAN THE _____ DOWNHAUL

CLEAR AWAY THE _____ HALYARD

TEND THE SHEET

SLACK THE _____ HALYARD

RUN AWAY WITH THE _____ DOWNHAUL

(The sheet is eased as the hanks bind on the stay)

7. To take in the spanker:

TOP THE SPANKER BOOM
LEAD OUT AND TEND THE OUTHaulS
MAN THE BRAILS AND INHAULS
THROW OFF THE OUTHaulS
HAUL DOWN, BRAIL IN

(If the wind has been free and the boom eased to the point where the sail would bind against the lee rigging when taken in, the preventer is eased and the boom hauled more inboard)

8. To take in the gaff topsail:

MAN THE GAFF TOPSAIL CLEWLINE
TEND THE SHEET AND HALYARD
THROW OFF THE TACK, SLACK THE SHEET AND HALYARD
HAUL DOWN

CHAPTER 3

LOCATION OF LINES

A. PINRAIL PATTERNS

At first glance, the maze of running rigging on EAGLE seems hopelessly complicated. You shudder to think that you must learn the names and functions of all of those lines; that you must, in fact, become able to locate and identify each and every one of them in the dark, without doubt or hesitation. However, after you have learned the functions of the various lines and the orderly plan governing their location, it becomes relatively simple. As an aid to learning, study out the following patterns on the Pinrail Diagrams:

1. Squaresail sheets - Squaresail sheets all secure to fiferails, ranging from forward to aft, bottom to top. Sheets and tacks for the courses are an exception. They secure to sheet and tack bitts, port and starboard, in waist and on the quarterdeck.

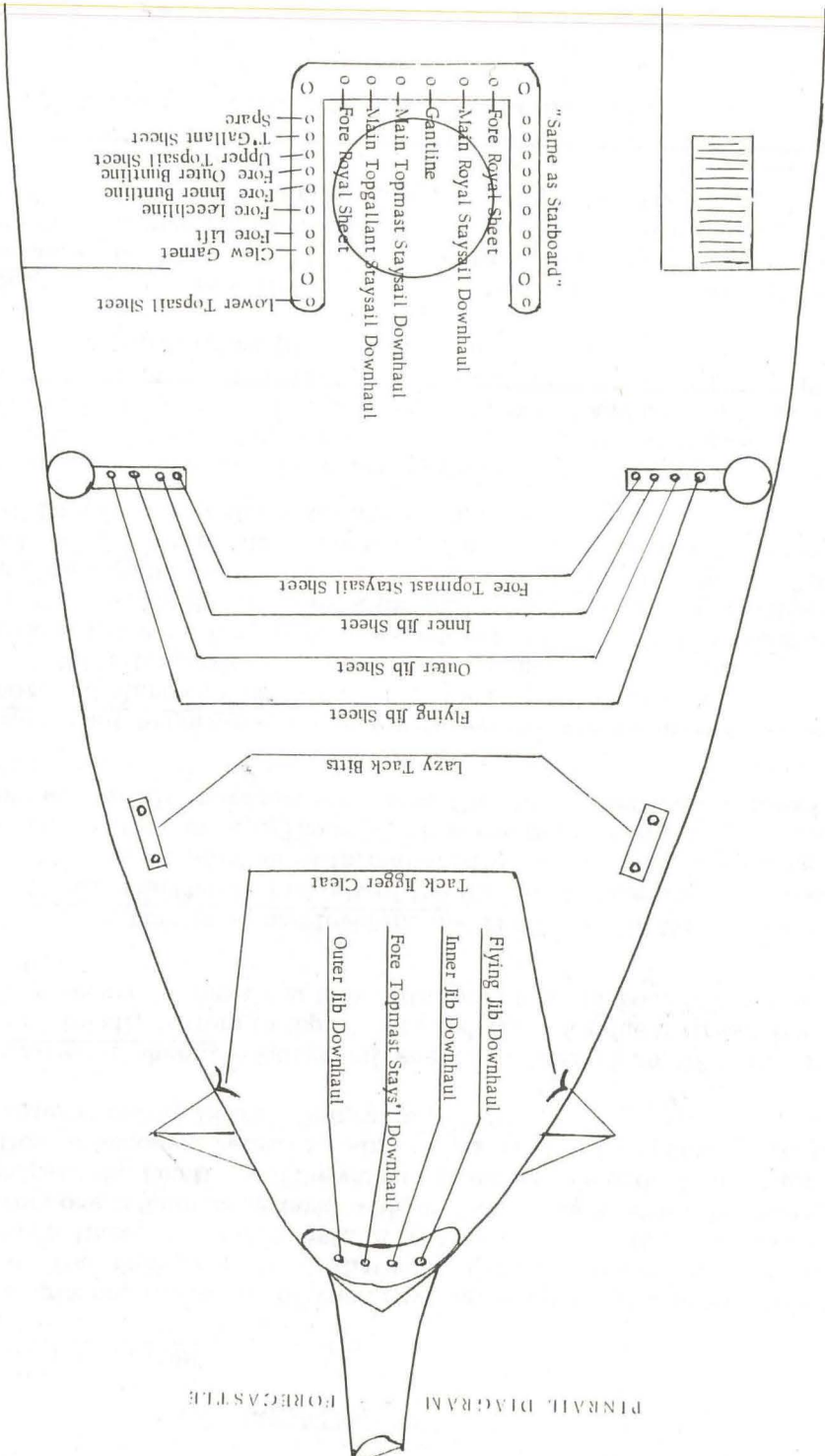
2. Clewlines, buntlines, and leechlines - Those for the foremast are at the pinrails, port and starboard, just aft of the forecastle head ladders. Those for the mainmast are at the waist pinrails, outboard of the fiferails. They range from forward to aft, bottom to top. Those which serve the courses are an exception. They secure to fiferails, port and starboard. Clewlines, buntlines, and leechlines are all nylon lines.

3. Squaresail halyards - Those for foreyards are secured at the forward pinrails, port and starboard just forward of the main tack bitts. Those for mainyards are at the after ends of the waist pinrails, port and starboard, abreast of the quarterdeck ladders. They alternate port and starboard, aft and upward. The pattern for the main is the reverse of the pattern for the fore. For quick reference, locate the largest tackle. This will be the upper topsail halyard. The royal halyard will be a few pins aft on the same side (smaller tackle). The topgallant halyard will be on the opposite side (intermediate sized tackle).

4. Headsail halyards - These are secured at the foreward pinrails, port and starboard, just forward of the main tack bitts, in the same general location as the squaresail halyards. They alternate starboard and port, aft and upward, i. e., fore topmast staysail halyard - starboard; inner jib halyard - port; outer jib halyard - starboard; flying jib halyard - port.

5. Staysail halyards - Those for main staysails are secured at the after ends of the waist pinrails, port and starboard, abreast of the quarterdeck ladders, in the same general location as the squaresail halyards. Those for mizzen staysails are at the quarterdeck pinrails, port and starboard. They range from forward to aft, bottom to top, with the intermediate level staysail halyard in each case being to starboard, the other two to port. A minor exception is the mizzen staysail halyard, which secures to the port side of the mizzen fiferail.

6. Headsail and staysail downhauls - The headsail downhauls secure to pins on the knighthead, just aft of the bowsprit. Staysail downhauls secure to pins on the atwartship sections of the fiferails.

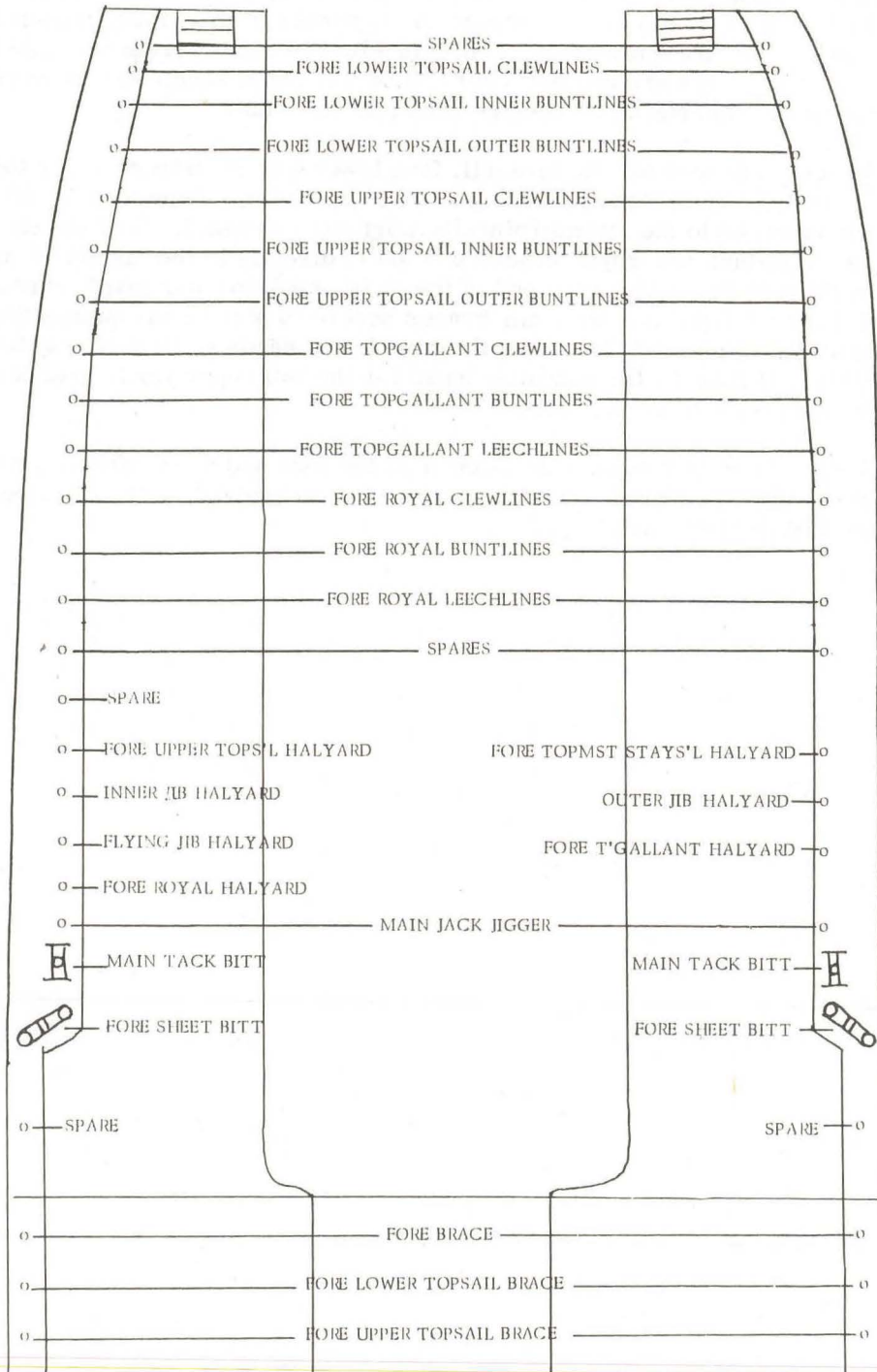


7. Headsail and staysail sheets - Headsail sheets secure to special sheet pin rails located athwartships on each side of the forecastle head (sometimes called monkey rails). They are all double sheets. Main staysail sheets secure to waist pinrails, port and starboard, forward of the ranges of clewlines, buntlines, and leechlines. They are single sheets. Sheet tackles are shifted from one side to the other, as the sheets are crossed over. Mizzen staysail sheets secure to the forward pins on the quarterdeck pinrails, port and starboard.

8. Braces - Braces for the foresail, fore lower topsail and fore upper topsail lead directly to bumpkins located outboard in the waist, thence through fairleads in the bulwarks to the forward pinrails, port and starboard, aft of the sheet bitts. Fore topgallant and royal braces are led in directly to the mainmast and secured to the pinrails in the after end of the waist, port and starboard, abreast of the quarterdeck ladders. All main braces secure to pins on the quarterdeck pinrails, port and starboard. Those for the three lower yards go first to quarterdeck bumpkins, thence to the pinrails; those for the two upper yards lead down from the mizzen mast to the pinrails.

9. Lifts - Fore and main lifts secure to the fore and main fiferails, port and starboard sides, respectively. They are easily recognized by the lift blocks and the fact that the lines are hemp.

PINRAIL DIAGRAM - WAIST - FORWARD

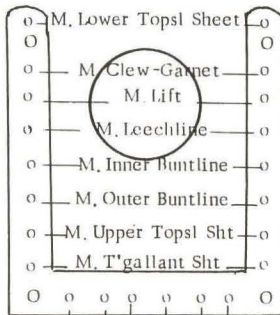


PINRAIL DIAGRAM - WAIST - AFT

o Spare
o Spare
o Spare

o Main Topmast Staysail Sheet
o Main Topgallant Staysail Sheet
o Main Royal Staysail Sheet

o Spare
o M, Lower Topsl Clewline
o M, Lower Topsl Inner Buntline
o M, Lower Topsl Outer Buntline
o M, Upper Topsl Clewline
o M, Upper Topsl Inner Buntline
o M, Upper Topsl Outer Buntline
o M, T'gallant Clewline
o M, T'gallant Buntline
o M, T'gallant Bunt-leechline
o M, Royal Clewline
o M, Royal Buntline
o M, Royal Bunt-leechline
o Spare
o Spare
o Main Topmast Staysl Halyard
o Spare
o Fore T'gallant Brace
o Fore Royal Brace
o M, T'gallant Halyard
o Spare
o M, Royal Staysl Halyd



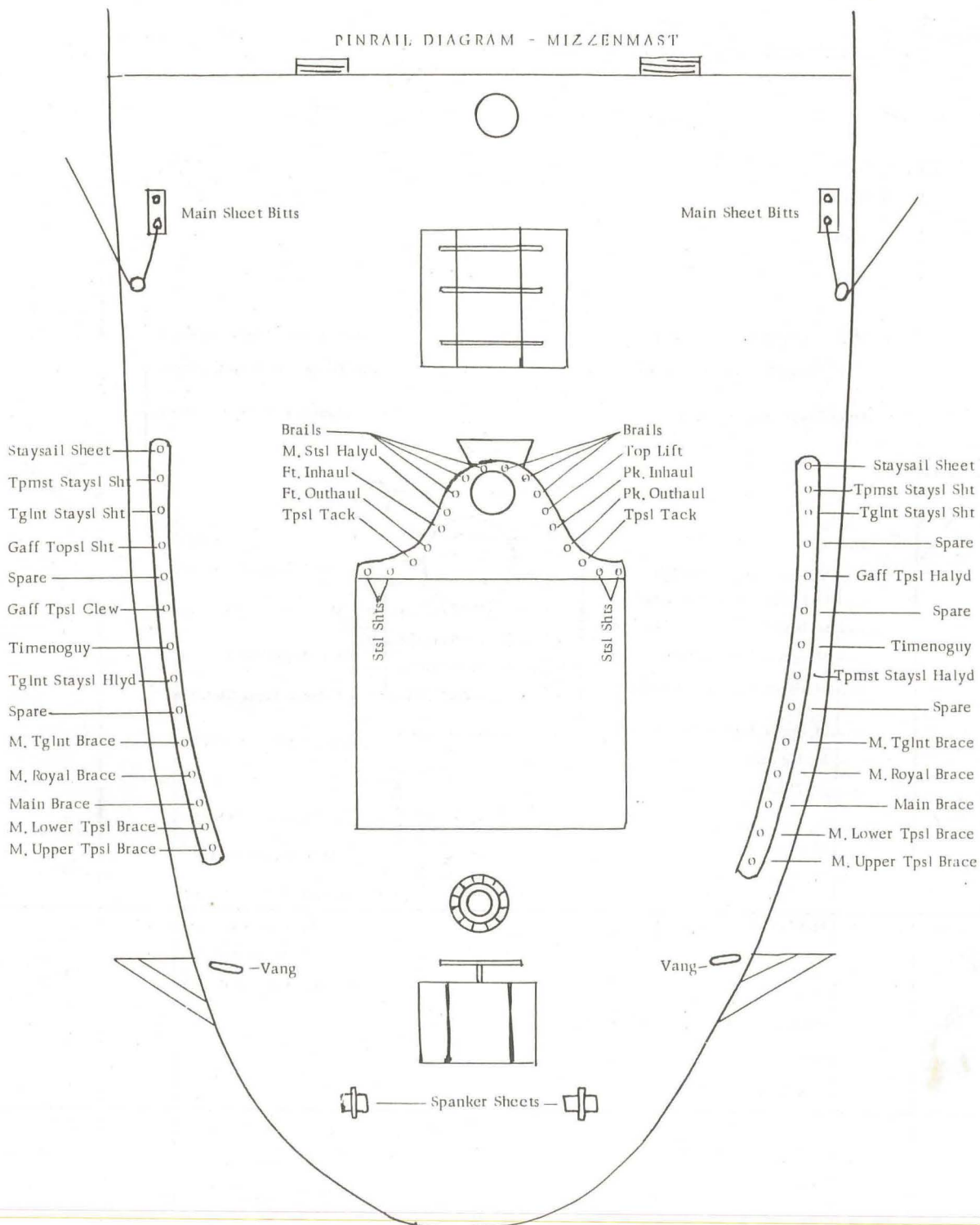
M, Royal Sheet
Miz. Topmast Staysl Downhaul
Miz. Staysl Downhaul
Miz. T'gallant Staysl Downhaul
M, Royal Sheet

Spare o
Spare o
Spare o

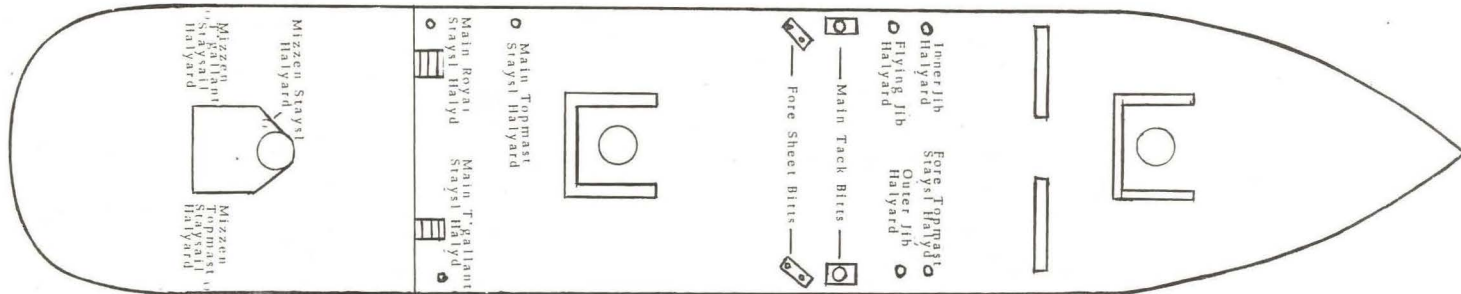
Main Topmast Staysail Sheet o
Main Topgallant Staysail Sheet o
Main Royal Staysail Sheet o

Spare o
M, L, Topsl Clewline o
M, L, Topsl In, Buntline o
M, L, Topsl Out, Buntline o
M, Upper Topsl Clewline o
M, Up, Topsl In, Buntline o
M, Up, Topsl Out, Buntline o
M, T'gallant Clewline o
M, T'gallant Buntline o
M, T'gallant Bunt-leechline o
M, Royal Clewline o
M, Royal Buntline o
M, Royal Bunt-leechline o

M, Upper Topsl Halyard o
Spare o
Fore T'gallant Brace o
Fore Royal Brace o
M, T'gallant Staysl Halyd o
M, Royal Halyard o

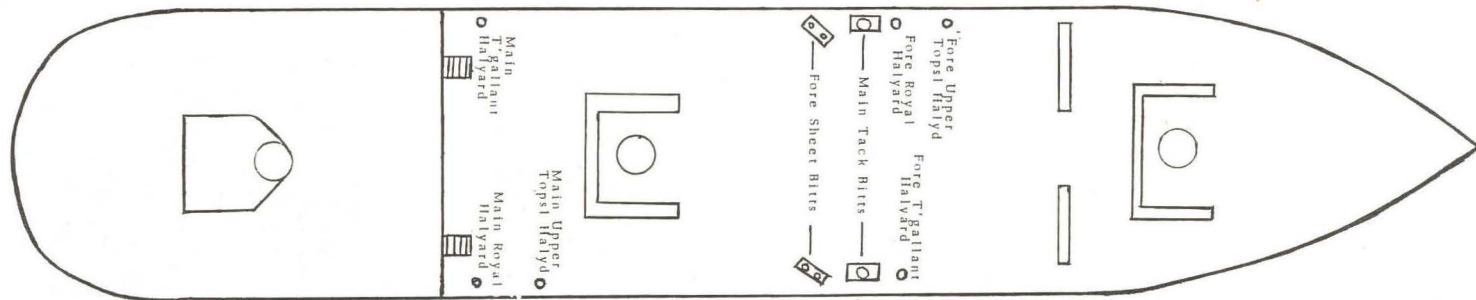


SQUARE SAILS



RULE: Squaresail halyards alternate port and starboard, aft and upward. For a quick reference, locate the largest purchase. It will be the upper topsail halyard. Royal will be a few pins aft on the same side with a smaller purchase. Top-gallant will be on the other side with intermediate purchase. All squaresail halyards are belayed to extra long pins.

HEADSAILS AND STAYSAILS



RULE: Staysail and headsail halyards alternate port and starboard. On the main and mizzen, only the halyard for the intermediate staysail is to starboard; halyards for the lowest and the highest staysails are to port.

FORCES IN SAILING

GENERAL

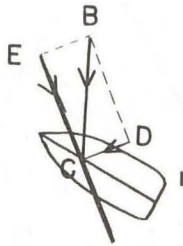


Figure 1.

B C = The force and direction of the apparent wind.
D C = The effective component of wind's force, perpendicular to the sail.

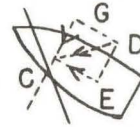


Figure 2.

C D = Effective component of wind force on sail.
C E = Longitudinal component of C D propelling ship along keel line.
G C = Lateral component of C D tending to force the ship to leeward, and creating a turning moment about the center of rotation.

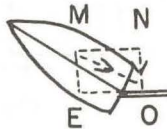


Figure 3.

M O = Force and direction of water pressure on rudder (right rudder)
N O = Effective component of M O perpendicular to rudder area.



Figure 4.

P O = Longitudinal component of N O retarding the ship.
R O = Lateral component of N O tending to force the ship to leeward, and producing a turning moment about the center of rotation.

CHAPTER 4

FORCES IN SAILING

The forces acting upon a ship maneuvering under sail are theoretically numerous and complicated; but so far as they are of practical importance in the handling of a ship, they may be reduced to simple terms. It will be convenient to consider them as they are manifested in the case of a ship sailing close-hauled and maneuvering to pass from one tack to the other.

It is sufficiently accurate for our present purpose to regard the sails as flat surfaces making an angle with the keel as in Figure 1. The ship is close-hauled and the wind is from forward of the beam and impinges upon the sail at a small angle. The motion of the ship modifies the direction and force of the wind as felt by the sails, and it is the effects of this modified or "apparent" wind which we must consider.

In Figure 1, BC represents the direction and force of the wind impinging upon a sail. It is clear that EC, the component of this force parallel to the surface of the sail, can exert no effect. The other component, DC, acts at right angles to the surface and is effective, but not altogether in producing headway, for it in turn may be separated into components, one longitudinal, driving the ship along the line of the keel, the other lateral, producing leeway (Figure 2). This component GC will produce a "turning moment" about the axis of rotation and will become of importance in the maneuvering of the ship.

Other forces are introduced if the rudder is put over to one side, here the resistance of the water against the face of the rudder, MO, may be resolved into two components; MN, parallel to the surface of the rudder and therefore ineffective; and NO, perpendicular to the surface. NO, again, may be resolved into a component parallel to the keel (retarding the ship) and another perpendicular to the keel, producing leeway and giving rise to a turning movement about the axis of rotation. Both the longitudinal and lateral forces above referred to are opposed by the resistance of the water. For the present, we are principally concerned with the lateral forces, in connection with their tendency to turn the ship. The lateral force of the wind may be regarded as concentrated at one point, which we will call the "center of lateral effort"; and the corresponding resistance of the water, as concentrated at a similar point, the "center of lateral resistance". If these two points coincide, the ship will hold steady course, otherwise she will tend to turn. If the center of effort is forward of the center of resistance, the head will turn to leeward; if the opposite conditions occur, the stern will tend to leeward and the head to windward. Therefore, we have in the rudder a means of quickly shifting a preponderance of force to either side, and so counteracting or reinforcing the turning tendencies due to the sails.

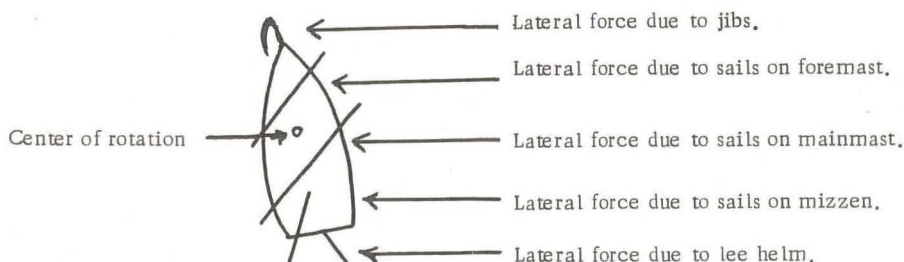
If a ship is deeper aft than forward, the center of lateral resistance will be farther aft than under ordinary circumstances; and other things being equal, the head will tend to leeward and weather rudder will be required to hold her up. Similarly, if the ship trims by the head, the stern will tend to leeward. In practice, of course, other things are not equal; and marked peculiarities of trim are met

by corresponding peculiarities in the sail plan; the arrangements usually being such that the ship, when sailing close-hauled, shall carry a small amount of lee rudder (the ship will tend to come up into the wind by herself unless there is a little lee rudder to hold her off).

In this connection, attention must be called to a force which enters as an important factor into the steering of a sailing ship in a fresh breeze. As the ship heels, the fuller lines of her lee bow above the water line become immersed, and the pressure of the water is increased, producing a tendency for the bow to fly up into the wind, and calling for a decided lee rudder. In a squall, this tendency to fly up into the wind may be a serious matter if it is desired to run off before the storm.

With regard to the axis of rotation about which the ship will turn, we may assume that this passes through the center of gravity. It will be understood from what has been said about the relation of the center of effort to the center of resistance, that this assumption leaves out of consideration many facts of theoretical importance; but it is found to be sufficiently exact for practical purposes, and is usually adopted in calculations upon the turning of ships.

Figure 5.



The lateral forces due to the sails and the rudder are shown in Figure 5, which indicates clearly the turning tendency of each. If we suppose the forces acting to leeward abaft the center of gravity to become suddenly predominant, as by putting down the helm for example, we shall find that the resulting motion of rotation is accompanied by at least two other motions. To begin with, the same force which, applied abaft the center of gravity, turns the ship, gives it a motion of translation directly to leeward. This can be illustrated by an object lying on a smooth table which is struck half way between the middle and one end. It will rotate, but at the same time it will go bodily to leeward. It may happen that the motion of rotation will throw the bow up more than the motion of translation throws the bow off. The bow may not actually go to leeward of the original line but the center of gravity will always go to leeward. The other factor which comes in to determine the path of the ship when her rudder is put over, is the momentum along the original course.

The effect of any sail may be varied by the way it is set and trimmed. The turning effect of the mizzen sails and headsails may be reduced by easing off the sheet, and the turning effect of a square sail may be reduced by bracing in. Similarly, the turning effect may be increased by flattening in the sheets or bracing up the yards. The turning effect of a squared sail may be entirely destroyed, either by bracing it square or by pointing it to the wind. This is important in many of the maneuvers which will be analyzed later.

It should be noted that in many of the instances in which the yards are squared, there is an important gain of maneuvering power in the headway or sternway which is given to the ship. In box-hauling, for example, the ship is thrown up into the wind and everything braced aback with the idea of killing her headway as quickly as possible and then backing her around stern to the wind; but, whereas the head yards are immediately braced sharp abox, in order that they shall not only assist in checking the ship and giving sternboard, but shall also pay her head off to leeward, the after yards being merely squared, they assist in checking the ship and sending her astern without opposing the turning of the stern into the wind. Later in the maneuver, when the wind begins to draw abaft the beam, they are kept pointed to the wind and still present no opposition to the turning.

It is important to remember the rudder is the most important of the turning powers concerned in maneuvering, and that its action depends upon the speed of the ship. For this reason, there is often an advantage in holding on to a sail whose direct turning effect is unfavorable to the maneuver, as long as it will add to the speed of the ship through the water. Thus, the turning effect of the foresail is distinctly unfavorable in tacking, but the sail being one of the largest and best pulling sails in the ship, its contribution to the speed may more than offset its unfavorable turning effect. Thus, a dull ship may be made to tack by keeping fast the foresheet for a while instead of letting it go at the order "HELM'S A-LEE".

CHAPTER 5

HANDLING EAGLE UNDER SAIL

A. MANEUVERING TO THE OPPOSITE TACK

While a fore and aft rigged vessel can generally sail within four or five points of the wind, a square-rigged vessel does well to sail within seven. One of the reasons for this is that the yards of a square rigger can be braced up only about four points before they fetch up against the lee backstays. A fore and aft sail can be trimmed in much closer to the centerline of the ship.

When a sailing vessel enjoys winds which permit her to make good the desired course, it is necessary only to trim sail to best advantage and let her go. When the desired course is upwind, however, the vessel can make progress only by sailing a series of "boards" or tacks, first with the wind on one side, then on the other, her progress in the desired direction being the sum of the components of the various boards in that direction.

It is obvious that working a square rigger like EAGLE directly to windward in this fashion would be an extremely slow and laborious process. During heavy weather, little or no progress could be made. For this reason it may be dangerous for a square rigger to be "caught on a lee shore" in a storm. Fortunately, however, the wind will seldom be directly opposite to the course which must be made good. Hence, reasonable progress can usually be made in the desired direction. Nevertheless, it is often necessary to maneuver to bring the wind from one side to the other. There are two basic ways of doing this: TACKING and WEARING. A third method; BOXHAULING, is a combination of the two. In TACKING the ship's head is brought through the wind. In WEARING, the ship's head is turned away from the wind and the stern through it. In BOXHAULING, the ship's head is initially thrown up into the wind, after which the vessel is backed around stern to wind, then sailed around on the other tack as in wearing. We will consider each of these maneuvers in turn.

1. Tacking - Tacking is the usual method of coming about when beating to windward. Its advantages are (1) the vessel must swing through only about twelve points of the compass rather than twenty, and (2) the vessel generally continues to make some distance to windward during the maneuver. However tacking is not feasible in very light or very heavy weather. The ship must be thrown up into the wind with all squaresails aback. This kills her headway very quickly. If she had little speed to start with, she will probably not go through the wind. Instead she will fall back on the same tack. In very strong winds, it may be imprudent to attempt to tack. The masts and rigging of a square rigger are designed primarily for wind forces acting on the back sides of the squaresails. When wind forces act on the front of the squaresails, the fore and aft strain is shifted from the backstays to the headstays, which are less in number and rigged only along the centerline. Backing of squaresails can be done safely in moderate winds. As we shall see it is deliberately done in both tacking and boxhauling. However it is dangerous to back squaresails in gale force winds. Another disadvantage to tacking in rough weather is the increased difficulty of turning upwind. Heavy seas breaking against the weather bow may thwart the maneuver entirely.

A rough rule of thumb is this: EAGLE will not tack if making less than six knots; she should not tack if making twelve or more. In the first case, she will probably not go through the wind; in the latter the true wind will be 25 knots or more and the vessel should not be thrown aback. However there can be considerable variations from this. In smooth water EAGLE may tack readily at speeds of less than 6 knots. In moderately rough water she may require at least 8 knots. Under rough sea conditions tacking would probably be avoided regardless of the wind force. As will be seen, it involves considerably more uncertainty and loss of control than wearing. These are conditions to be avoided when the vessel is laboring in heavy weather.

Before describing in detail how the tacking maneuver is executed, let us consider the turning effect of the various sails. Manifestly the headsails and foresails, being forward of the ship's pivot point, will tend to turn the ship's head away from the wind. This tendency can be accentuated by trimming the sails to present their greatest lateral area to the wind. It can be minimized by trimming the sails so that they shake or spill. The sails set on or from the mainmast, being close to the pivot point, exert but little turning movement. However they have considerable propelling power or retarding effect, depending upon whether they are drawing or backing, and this must be carefully considered in all maneuvers. The spanker and mizzen staysails, being aft of the pivot point, will tend to force the ship's head up into the wind. This can be accentuated by hauling the spanker boom amidships and flattening mizzen staysail sheets. It can be minimized by taking in these staysails and hauling in the spanker.

The basic force in turning, of course, is the ship's rudder. How strong a turning force the rudder exerts is a function of the rudder angle, the rudder area, and the speed of the vessel through the water. When the rudder is put hard over there is a rapid reduction in the vessel's speed. This is principally due to the fact that the vessel, in the initial part of the turn, is skidding sidewise through the water. Momentum causes it to tend to continue in the initial direction but the rudder action causes it to slew sidewise. The greatly increased resistance thereby encountered by the underwater body quickly reduces speed by as much as 40%. As the vessel picks up angular momentum, this underwater body resistance diminishes. However there remains a constant rudder drag. It acts in the manner of a large bucket hung over the stern. As the speed of the vessel drops through these forces, the turning effect of the rudder diminishes. As we shall see it is common for the EAGLE to be dead in the water by the time she is head-to-wind in a tacking evolution. In this case the sails alone must be utilized to continue the turn through the wind. The rudder may be of some further assistance if put over in the opposite direction if and when the vessel commences to back down. But this effect is relatively minor.

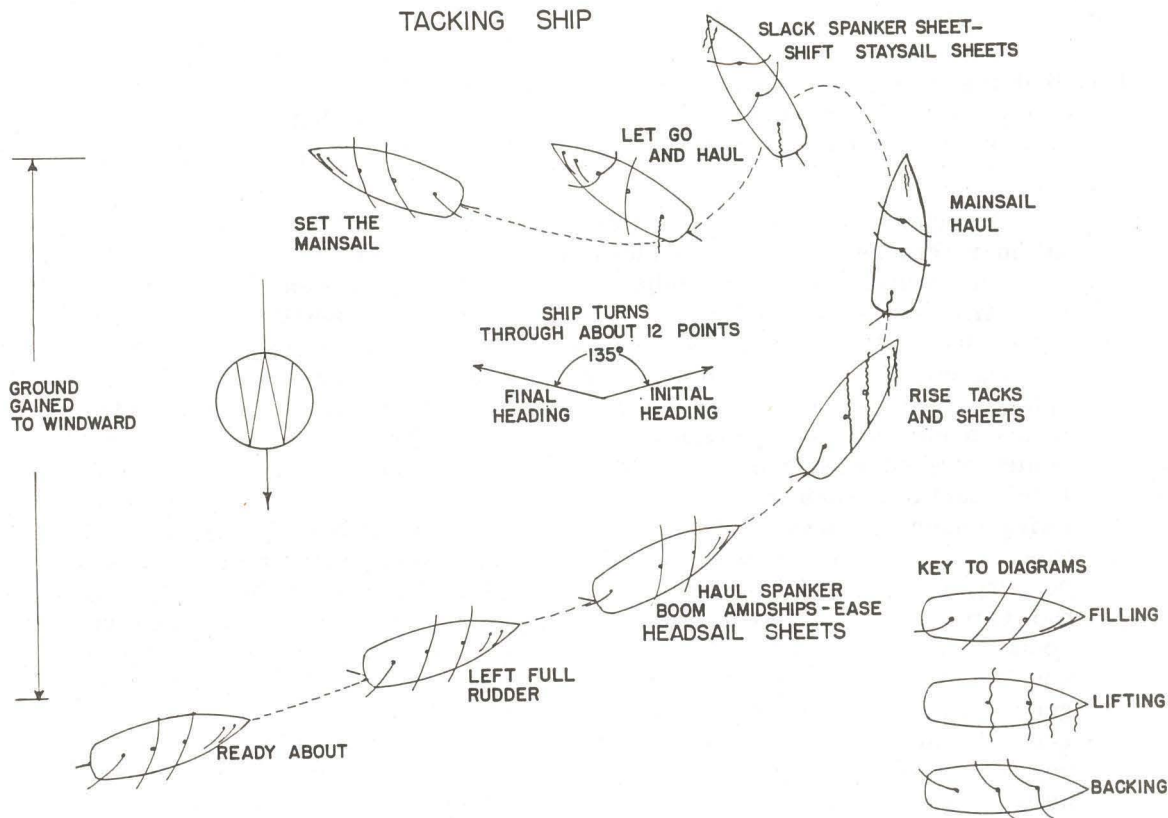
Because of the paramount importance of the rudder forces, it is important that the EAGLE be moving at her best speed when the tacking maneuver is started. It is also important that the arc through which she must turn to bring head to wind be as small as possible. This requires some compromise. If the vessel is held just on the edge of luffing, she will have a shorter distance to turn; however she will not be making her best speed. On the other hand if we attempt to pick up speed by letting her fall off too far, the added speed will be offset by the fact that

she will have a greater arc through which she must turn. The best compromise is to have EAGLE sailing full and by, as high as possible consistent with sails drawing full. Then turn the wheel gradually rather than suddenly. This reduces the initial slowing effect and allows angular momentum to be developed with a greater residual speed. It thereby produces the maximum overall sustained turning effect.

There follows (1) a description of the tacking evolution, based on the assumption that the vessel is sailing full and by on a port tack with all sails set at the start, (2) a list of orders for the above evolution, with explanatory notes, and (3) a list of common causes for failure to tack.

a. Description of tacking evolution - With the ship sailing full and by, and all in readiness, the rudder is slowly turned to full left. Simultaneously the spanker boom is hauled amidships and the head sheets are eased. The ship's head will now swing quite rapidly upwind. The squaresails will first lift, then come aback. At this point the mainsail is hauled up in its gear to minimize backing effect and to facilitate vision from aft forward. Simultaneously the upper two staysails on main and mizzen are taken in. This is done in order to avoid backing and to permit cross-over of sheets. Just before the vessel comes head-to-wind, the main yards are braced around to the opposite tack. If this part of the maneuver is properly timed and coordinated, the yards will swing under the force of the wind alone. Maximum teamwork is required if this advantage is to be realized. The starboard (weather) main braces must be surged freely yet kept under control so that they can be checked before the yards slam up against the backstays. The port main braces must be rounded in very rapidly in order to keep them from fouling. The vessel is now all aback, with foresails on one tack, mainsails on the other. If all has gone well, she will still be moving ahead slowly, swinging to port. As soon as she is through the wind the headsails, which are now all aback, cause her to pay off rapidly. The spanker sheet is slacked to avoid interfering with this action. The rudder is brought amidships. Headsail and staysail sheets are crossed over the stays and the new lee sheets hauled aft. The staysails are reset. When the mainsails start to fill it is time to haul the head yards around to the new tack. The wind will oppose rather than assist this action so a good pull is required. When it is completed, all sails will be drawing and the vessel will forge ahead. As she steadies on her new course, the spanker is sheeted in, the fore and main tacks are boarded, all sails are trimmed, and all lines are made up.

Sometimes things do not work out as well as indicated above, and EAGLE comes dead in the water when head to wind, then starts backing down. The rudder must be shifted to full right at this point to keep the bow swinging through the wind. If the sails are correctly handled the vessel will back off on the new tack, then forge ahead again after the sails fill. If the sails are not properly handled or if the ship comes to a stand before she is head to wind, she will fall back on the original tack. It will then be necessary to haul the main yards back to the original tack, trim sail, gather speed, and try again.



b. Commands used in tacking

READY ABOUT - Hands ready at stations, braces laid out, lines free for running, tack jiggers cleared away, cross-over line rigged for main topmast staysail.

HARD A' LEE - This command is relayed fore and aft to advise all hands that the tacking maneuver is commencing. Immediately after this command the Officer-of-the-Deck orders LEFT (RIGHT) FULL RUDDER.

HAUL SPANKER BOOM AMIDSHIPS - EASE THE HEADSAIL SHEETS - Given as soon as the ship starts her swing to windward.

RISE TACKS AND SHEETS - Given when mainsail lifts. Hands run away with main clew garnets and buntlines, slacking tacks and sheets, and haul mainsail up in its gear. This command also serves as the signal to take in any of the upper staysails (main top gallant, main royal, mizzen topmast, mizzen top gallant) that may be set.

MAINSAIL HAUL - Given when wind is about 1/2 point on weather bow. Main yards are braced around rapidly to the new tack. Clewlines, buntlines, leechlines and lee lifts must be off the pins before you start. Haul on weather lifts as yards come around to keep them from cockbilling.

SLACK THE SPANKER SHEET - HAUL AFT THE LEE HEADSAIL SHEETS - Given when bow has come through the wind. Spanker is eased out to avoid impeding the trim to leeward. Backing the headsails is no longer necessary. The lee sheets are hauled when the sails will fill in normal manner.

LET GO AND HAUL - Given when main topsails begin to fill. Fore yards are braced around to new tack. Clewlines, buntlines, leechlines, and lifts must be handled as on the main. In addition, fore tacks and sheets must be slacked and/or hauled.

SET THE MAINSAIL - Given when maneuver has been completed and ship has squared away on new tack.

NOTES

A. Rudder commands are given in accordance with the vessel's behavior.

B. The taking in and resetting of staysails as well as the crossing over of staysail sheets are done on command of the appropriate Mast Captains. These actions must be timed so as to facilitate rather than impede the maneuver.

C. If the vessel was sailing with tacks boarded at the outset, tack jiggers will automatically be rigged on the new tack upon completion of the maneuver. If not, and the Officer-of-the-Deck wants the tacks boarded, he will order this done.

D. Mast Captains should, without command, see that all sails under their cognizance are drawing properly, that yards are trimmed parallel to the horizon, that buntlines and leech lines are overhauled and stopped off lightly with rotten stuff, and that all lines are properly made up and secured at the end of the maneuver.

c. Common causes for failure to tack

A. Insufficient speed at the start due to vessel being too closely pinched (too high on the wind).

B. Executing MAINSAIL HAUL too soon. This has a marked braking effect on the vessel. It may cause her to come dead in the water before her bow comes up into the wind. When this happens she will always fall back on the original tack, regardless of what you do with the rudder or sails.

C. Crossing staysail or headsail sheets too soon and thereby backing the sails in a manner to impede rather than facilitate the vessel's swing through the wind.

D. Failure to handle the spanker in a manner to facilitate the vessel's swing through the wind.

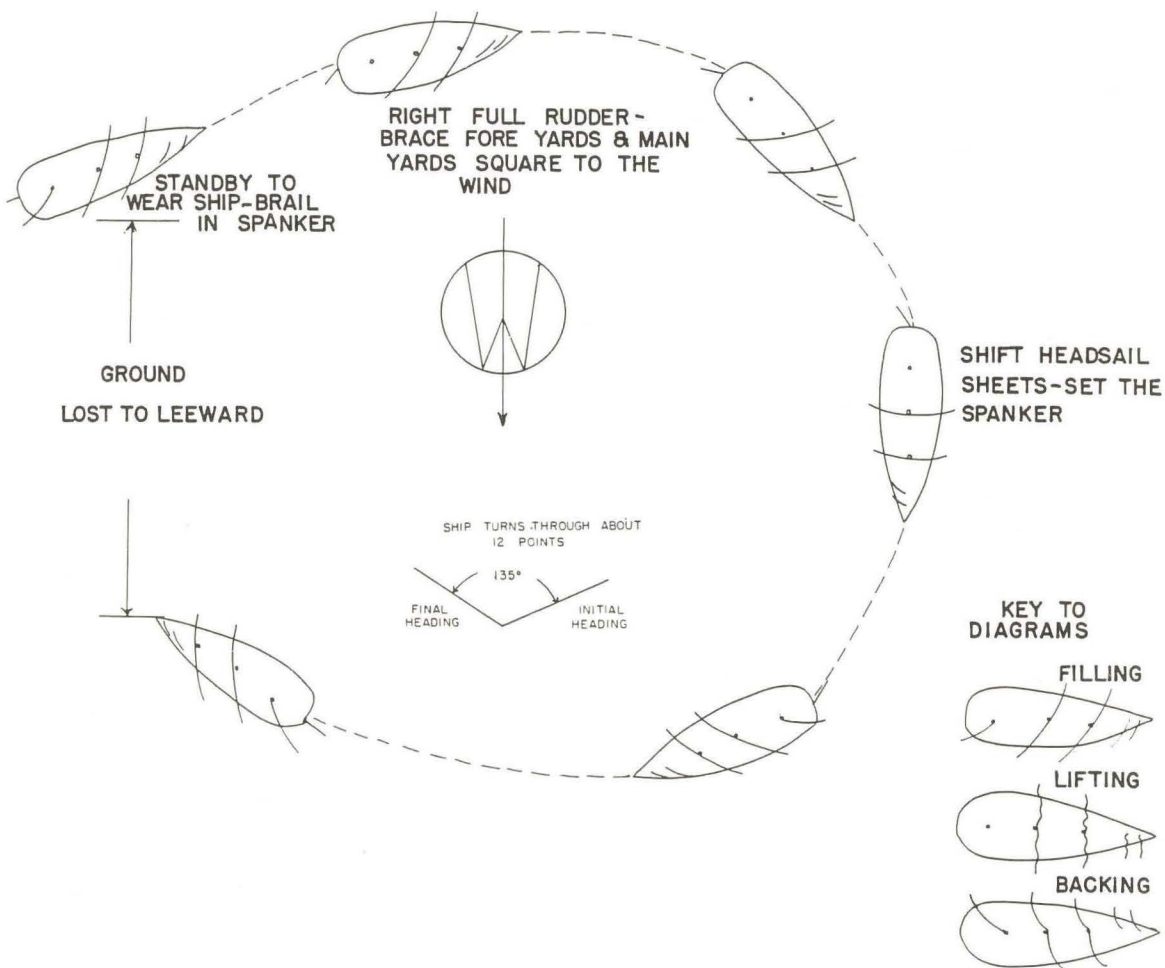
2. Wearing - Wearing is the method of coming about utilized when weather conditions or available manpower do not permit tacking. Its advantages are (1) it can be accomplished by the watch on deck alone, (2) it does not involve backing of squaresails, and (3) the vessel is under full control at all times. Its disadvantage is that it involves loss of distance to leeward.

Prior to commencing this evolution, all staysails should be taken in, the spanker brailed in, and the mainsail taken up in its gear. Braces should be laid out for running. Clewlines, buntlines, and leechlines should be off the pins. The maneuver begins by putting the rudder hard over in a direction to turn the ship's head away from the wind. At the same time the hands brace in the main yards until the sails are lifting. With the headsails and fore sails drawing full, the main sails lifting, and all sails on the mizzen doused, the ship's head will pay off rapidly. The main yards are braced around progressively so as to keep the main sails lifting as the vessel swings downwind. The weather lift is hauled as necessary to avoid cockbill. When the main yards are braced up sharp on the opposite tack, the hands shift to the fore braces. As the ship approaches the downwind position the main sails fill and the foresails begin to go light. It is now time to progressively brace around the fore yards to keep the fore sails lifting. Simultaneously the spanker should be set and the headsail sheets crossed over. The ship will now swing rapidly upwind. When the fore yards are braced up sharp on the new tack, set the mainsail, set the staysails, board the tacks, trim all sails, and square away. It is not essential that main sails and fore sails be kept lifting during the bracing operations. However, the bracing can be done by a fewer number of hands if done in this manner; further, this method facilitates the turn of the ship. When turning off the wind, the wind force is acting forward of the ship's pivot point; when turning back upwind, it is acting aft of the ship's pivot point. When sufficient hands are available to man both main and fore yards simultaneously, the ship can be "sailed around" through its turn at greater speed by bracing both yards progressively in such a manner as to keep all squaresails drawing to maximum advantage. This will result in a more expeditious maneuver. However it will require more than the watch on deck.

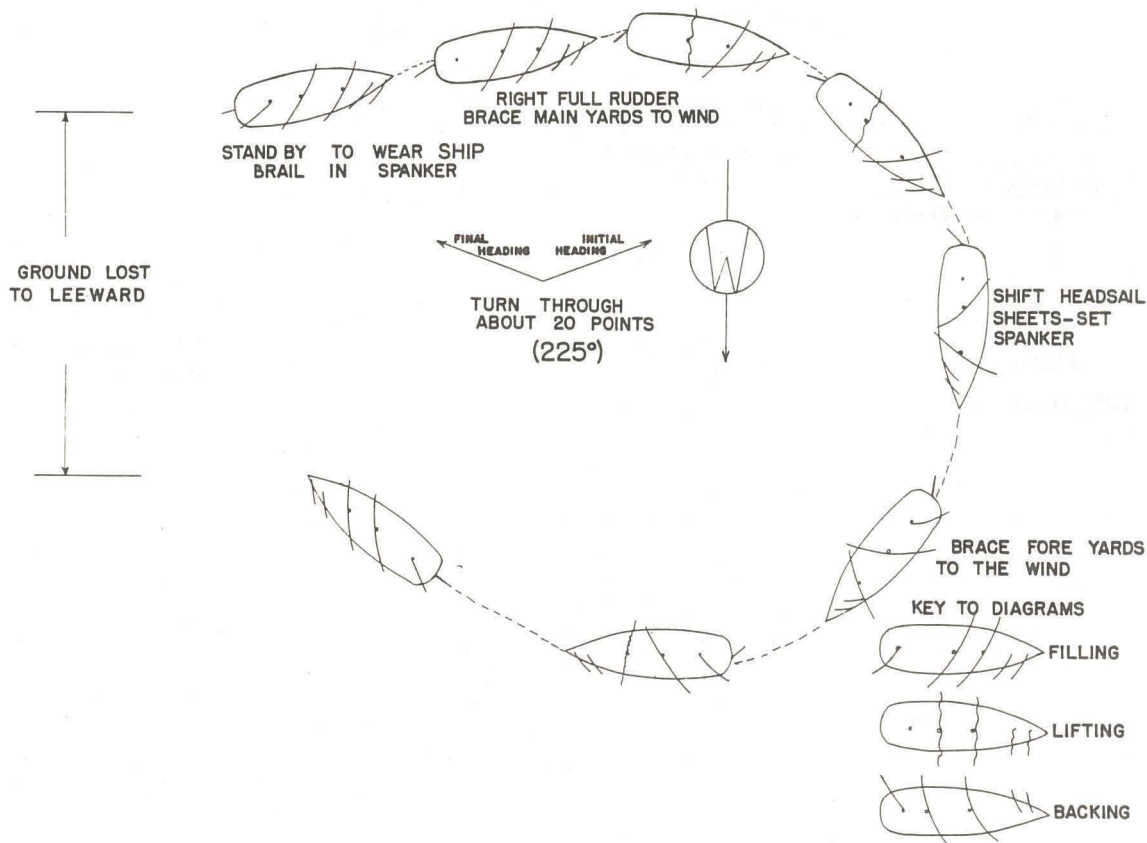
The basic commands for wearing ship are as follows:

STAND BY TO WEAR SHIP - Hands ready at stations, braces laid out, lines free for running, tack jigger cleared away. If spanker and staysails are set, this is the signal for Mast Captains to take them in.

WEARING SHIP - SIMULTANEOUS BRACING



WEARING SHIP- PROGRESSIVE BRACING



RISE TACKS AND SHEETS - Hands run away with main clew garnets and buntlines, slacking tacks and sheets, and haul mainsail up in its gear.

WEAR - O - This command is relayed fore and aft to advise all hands that the wearing maneuver is commencing. Immediately after this command, the Officer-of-the-Deck orders RIGHT (LEFT) FULL RUDDER.

BRACE MAIN YARDS TO THE WIND - Hands haul with a will on weather main braces, slacking lee main braces, until main yards are lifting. Thereafter they continue to brace yards around to the wind, with little effort, until they are braced up sharp on opposit tack.

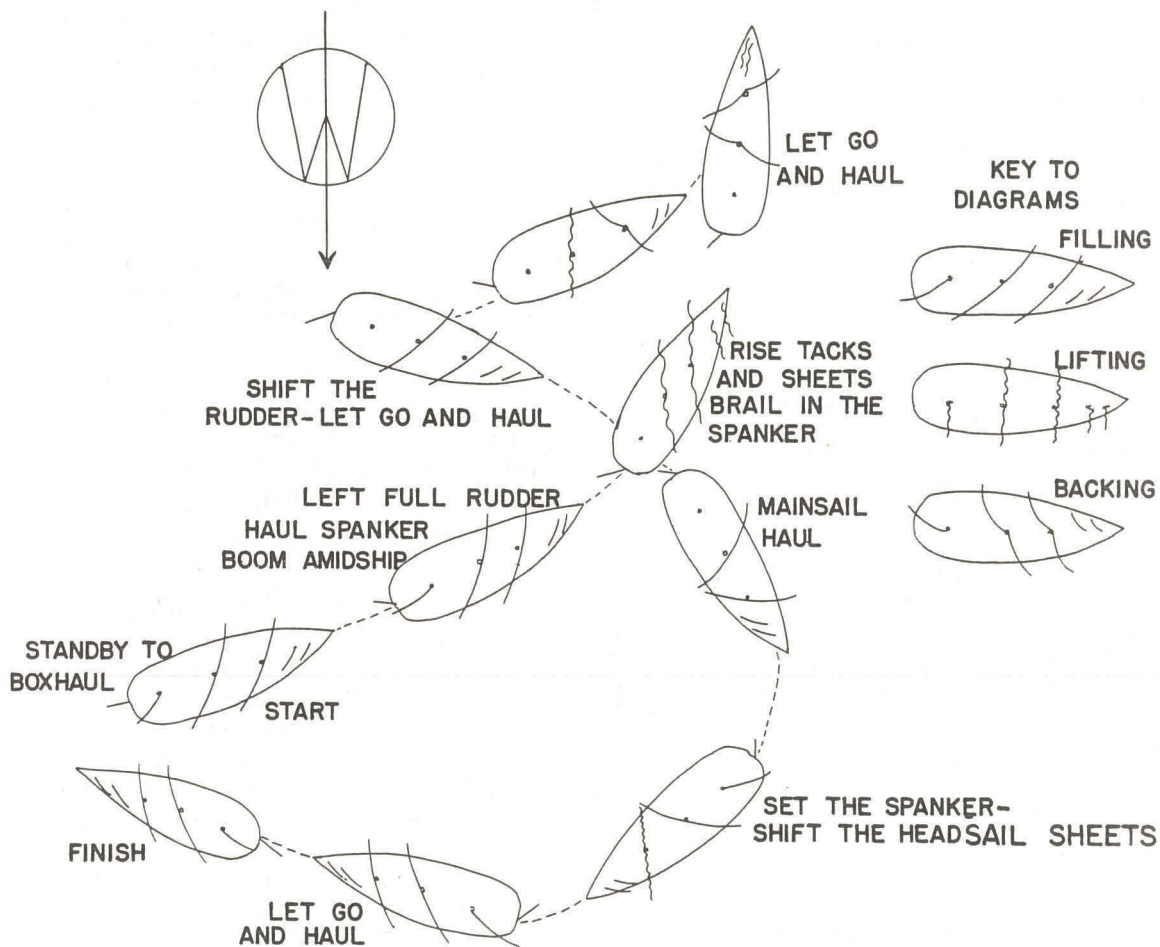
SHIFT HEADSAIL SHEETS - SET THE SPANKER - This command is given when the main sails have filled and the ship is beginning its turn back upwind.

BRACE FORE YARDS TO THE WIND - This command is given when fore sails start to lift. They are kept lifting by progressive bracing as the ship turns up to windward until they are braced up sharp on the new tack.

SET THE MAINSAIL - Given when ship is squared away on new tack. Mainsail is reset. As in tacking, other sails are now automatically restored to their original condition by Mast Captains, without specific command. Staysails which were set are re-set; if the tacks were boarded, they are again boarded. The Officer-of-the-Deck will order any change desired.

3. Boxhauling - Boxhauling combines certain features of tacking and wearing so as to permit the ship to come about with a minimum of gain or loss of distance to windward. It would be used when some danger ahead precludes the headreach you will realize in tacking, yet you are unwilling to accept the large loss of distance to leeward involved in ordinary wearing. It would find its most common application in maneuvering in a river or other narrow passageway. It is chiefly of historical interest insofar as EAGLE sailing is concerned. It involves considerably more bracing than either tacking or wearing. For this reason it is unhandy and cumbersome on a large vessel which is not equipped with brace winches. The maneuver is started like tacking. The rudder is put hard over, the spanker boom is hauled amidships, the headsail sheets are eased and the vessel commences to swing rapidly upwind. When the mainsail begins to lift, it is hauled up on its gear. Unlike tacking, however, we now haul the fore yards and brace them sharp abox (at right angles to the wind). This causes the vessel to stop quickly with her head a little bit off the wind. The rudder is kept hard over, the bow falls rapidly back on the original tack, and the vessel backs into the wind. To facilitate this backing, the main yards are braced to the wind. When the wind is abeam the headyards are hauled again. The foresails fill. As the ship begins to gather headway the helm is shifted. The main sails are now allowed to fill and the ship is sailed around to the opposite tack exactly as in wearing. The amount of headreach realized when she is thrown up into the wind offsets to a considerable extent the loss of distance suffered through the wearing maneuver. As will be noted, the maneuver requires that the fore yards be hauled three times (as opposed to once in tacking and wearing).

BOXHAULING

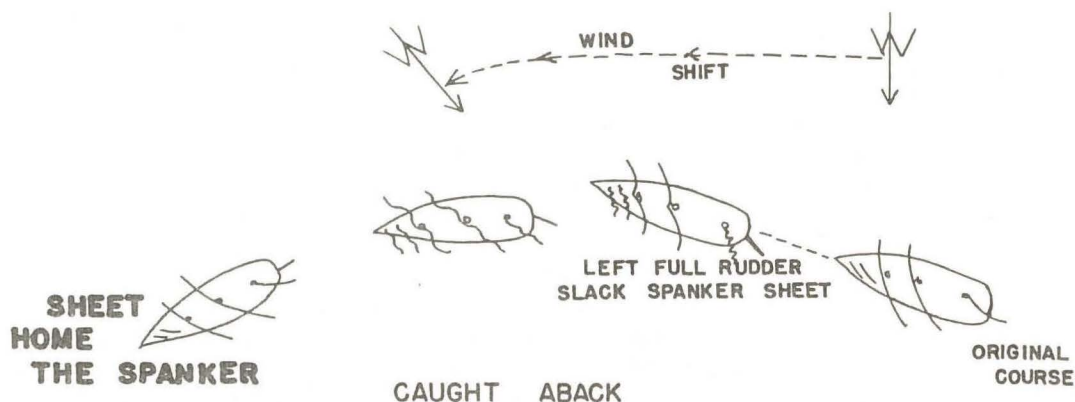


B. MANEUVERING WHEN CAUGHT ABACK

A square rigged vessel is "caught aback" when the wind (through accident rather than design) is blowing on the forward rather than the after sides of its squaresails. This may happen through the negligence of a helmsman who inadvertently allows the ship's head to swing up into the wind. Or it may come about as a result of a sudden shift of wind which the Officer-of-the Deck has not anticipated. As has been mentioned at the beginning of this chapter, there is no harm in throwing squaresails aback in moderate winds; in fact this is deliberately done in many maneuvers. However the rigging of a square rigged vessel is not designed to withstand very heavy strains from forward. It may thus be dangerous to be caught aback in strong winds. EAGLE officer's must be constantly alert to avoid this danger, particularly when the vessel is sailing close hauled. Any momentary lapse on the part of the helmsman must be immediately detected and corrected. Weather conditions must be constantly studied so that sudden shifts of wind may be anticipated. If the wind becomes erratic in direction, the vessel should be eased off the wind until the situation clarifies.

Despite best efforts, unforeseeable wind shifts do occur and the EAGLE, like all other square-riggers, will occasionally find herself "caught aback". The Officer-of-the-Deck must then be able to take immediate corrective action. There are several possible courses of action for recovering. The correct one will depend upon the circumstances. They are described briefly hereafter.

1. Recovering by turning away from wind - If the wind shift has been relatively minor in amount (1 to 2 points) and has been detected immediately, the situation can usually be corrected by the simple expedient of ordering right or left full rudder (as appropriate) and turning the ship's head away from the wind. Allowing the spankers sheet to run will facilitate the turn. The ship will, of course, respond to its rudder only so long as it continues to make way through the water. This type of recovery therefore requires that the rudder be put over quickly, before the backing of the squaresails has killed the ship's headway. If the ship comes dead in the water while still aback, you'll have to try something else.



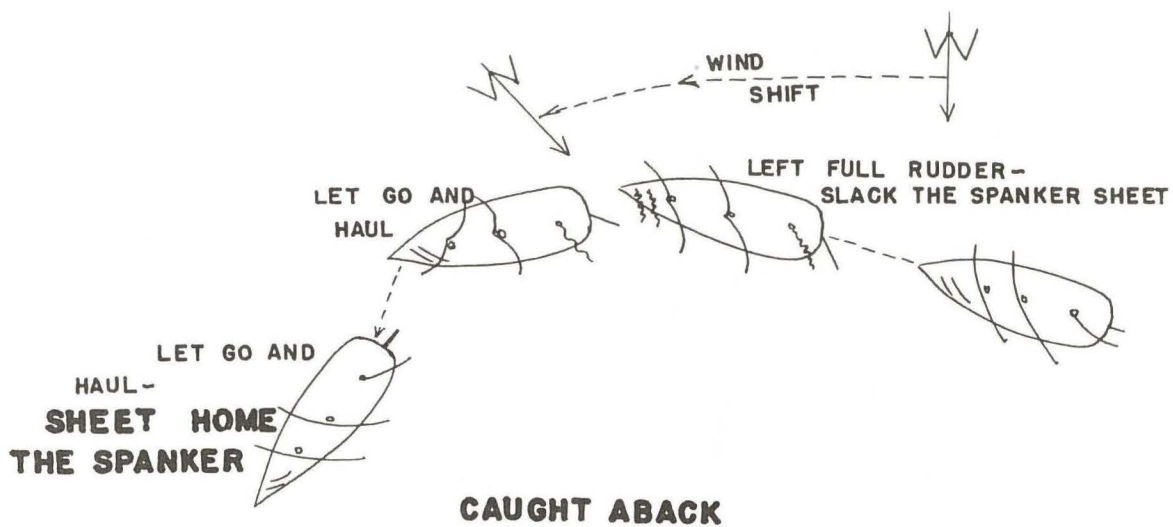
A. - Recovering by turning away from wind

2. Recovering by boxing off on original tack - If the ship is unable to complete its turn away before coming dead in the water, but the wind is still on the original bow, the turn can be completed by bracing the headyards abox and letting the spanker sheet run. This will result in wind force being applied forward of the ship's pivot point, causing the bow to continue to fall off. When the main sails begin to fill, the headyards are hauled back to the original tack and the vessel sails off. Care will have to be taken to see that staysails do not impede the turn. If the vessel backs down, the rudder will have to be shifted to assist in backing stern to wind.

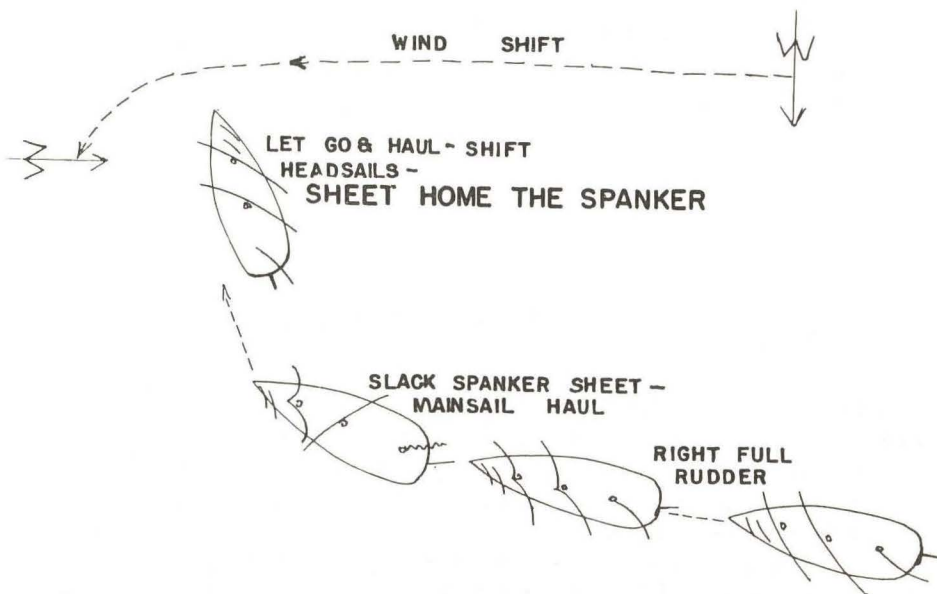
3. Recovering by hauling yards as in tacking - If the wind has come around to dead ahead on the opposite bow, and there is no tactical objection to sailing on the opposite tack, you may recover by proceeding exactly as in tacking. The situation is essentially the same, the only difference being that the wind is ahead and the sails are aback through accident rather than design. Execute MAINSAIL HAUL first. When the main yards begin to fill execute LET GO AND HAUL. As in tacking be sure that the spanker, staysails, headsails, and rudder are handled so as to facilitate paying off in the desired direction.

4. To recover on the same tack by chapelling ship - If the head yards were not braced abox in time and the wind has come around to the opposite bow, you can recover on the same tack by an old maneuver known as CHAPELLING SHIP. With all squaresails aback and the wind on the old lee bow, brace the main yards square; brail in the spanker, and shift the rudder to facilitate backing stern to wind. As the ship backs stern to wind, the main yards will first lift, then fill. As the ship forges ahead, shift the rudder and brace around the main yards gradually to keep them drawing to maximum advantage. Turn the stern through the wind as in wearing and square away on the original tack. CHAPELLING SHIP can also be accomplished (though less expeditiously) without any bracing. With the wind on the opposite bow and all squaresails aback, brail in the spanker and shift the rudder to facilitate backing stern to wind. Hold the head sheets and let the bow fall off. When the wind reaches the quarter, the squaresails will lift, then fill. As they fill, shift the rudder, sail around as in wearing, re-set the spanker, and square away on the original tack.

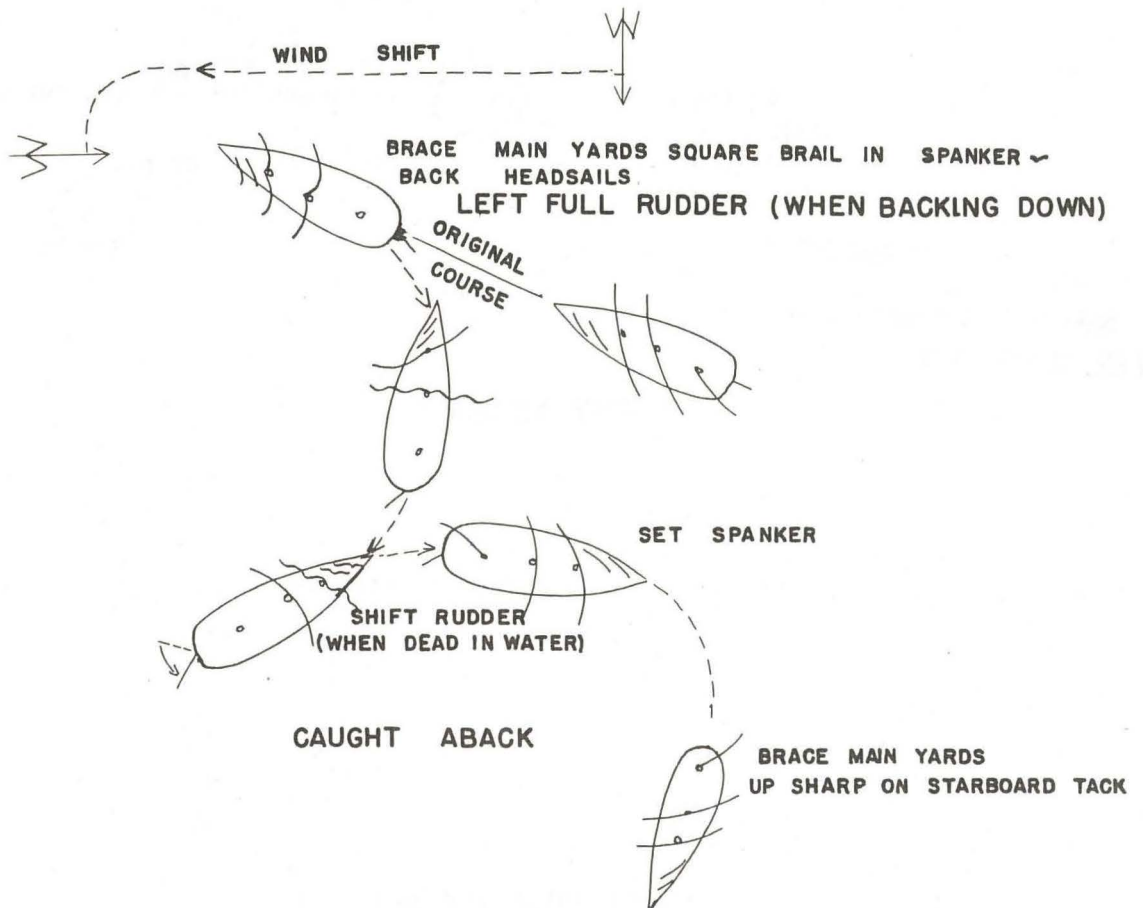
Note that CHAPELLING ship is in many ways similar to BOXHAULING. In each maneuver the vessel finds itself aback. In each maneuver the vessel backs stern to wind the same way, then when the squaresails fill, sails around as in wearing. The difference is that in CHAPELLING, you start with the yards braced up on the opposite tack. Thus the foreyards are already abox, or nearly so. As the bow pays off you brace the main yards square and shift the rudder to facilitate backing stern to wind. The fore sails will still be aback when the main sails fill. However by holding the headsheets the bow will continue to pay off. This will cause the fore sails to eventually lift, then draw. The main yards are then braced up again on the original tack and the ship is sailed around until it is again on the wind.



B. - Recovering by boxing off on original tack



C. - Recovering by hauling yards as in tacking



D. - Recovering by chapelling ship

In BOXHAULING, after the original LET GO AND HAUL has been executed to brace the head yards abox, these yards are again braced up on the original tack, then back on the new tack, making a total of three times they are hauled. The second hauling of the fore yards is not essential to the completion of the down wind turn. It is done only to expedite it and thereby accomplish the purpose of the maneuver, namely, to come about with a minimum gain or loss of distance to windward. In CHAPELLING SHIP, the fore yards, already braced abox are left there. The ship still comes around but goes into its downwind turn somewhat more slowly and completes it with more loss of distance to leeward.

C. SHORTENING SAIL

When the EAGLE is sailing full-and-by, trimmed to maximum advantage, she will make good a speed approximately half the speed of the wind. As the wind velocity increases, however, the heel of the vessel and the strain on the rigging will increase accordingly. When to start shortening sail is a matter of judgement, dependent upon the tactical situation, the state of the sea, the weather to be expected, the experience level of the crew, the geographical location of the vessel, and many other factors. There have been times when the ship has been sailed at 16 knots for sustained periods without casualty. At other times the ship has blown out sails and labored excessively at speeds of 12 knots. No fixed rules can be laid down. This is an area where a feel for the ship and an indefinable seaman's sense must control. Shortening sail unnecessarily or too early will result in lost distance and failure to realize the maximum potential of the vessel. Delaying it too long can result in blown out sails, rigging damage, and possible injury to personnel.

In shortening sail, you first take in the royals and topgallants, then the courses, then the upper topsails. Staysails come in from the top down. In a real blow you may end up with the vessel sailing under lower topsails alone or possibly hove to under main lower topsail and fore topmast staysail. Be sure that the moveable yards are completely in their lifts, with braces taut, before you send men out to furl. This will ensure a secure platform for the men working on the yards. Be sure also that the sails are securely hauled up in their gear with buntlines, leechlines, and clewlines secured on their pins. A sudden "bloomer" aloft can cause consternation to even the hardest of sail handlers. Lastly be sure that the wind remains on the after sides of the yards. A dangerous situation is created when loose sail is permitted to flap back in the faces of the men who are trying to furl it.

When the wind force is such that furling is difficult, concentrate your manpower on the weather sides of the yardarms and furl progressively from weather to leeward, never the reverse. In rough weather, give no thought to the niceties of a harbor furl; concentrate only on smothering and securing the sail as quickly and effectively as you can.

Every cadet can anticipate at least one occasion where he will be called upon to lay aloft and furl sail under conditions of darkness and high winds. This is where the "stout heart" portion of the ACADEMY Mission is vindicated. It is actually not particularly dangerous so long as the cadet keeps his head, works with his shipmates as a team, and follows a few common sense rules. But it does take some courage and determination.

As we have previously seen, squaresail yards will tend to "fly up to weather". Because of this, when we settle a yard in anticipation of furling, we generally remove the slack which develops in the braces by rounding in the lee rather than the weather brace. It is easier to take the slack out of a lee brace than to haul aft a weather brace. Some variation may be required when the vessel is hard on the wind. In this case rounding in the lee braces may bring the yardarms up against the backstays and allow the weather braces to go slack. This puts an undue strain on the backstays and makes the yardarms less secure.

When a really strong wind is blowing, the force of the wind in the sail may be strong enough to bind the shoe of a moveable yardarm in its track and prevent the yard from settling, even though its halyard is completely slack. For this reason it is essential to visually check to make sure that the yard is all the way down in its lifts before sending anyone out on it to furl sail. This is particularly important at night when it cannot be readily ascertained from deck that a yard is, in fact, in its lifts. A yard which is not completely in its lifts and secured by taut braces can provide unwelcome thrills to those who venture out on it.

Since the moveable yards on the foremast and mainmast have fixed lifts, they will, when lowered, probably assume a trim at variance with that of the fixed yards. With respect to the topgallant and royal yards, this is an esthetic consideration only. However it may create actual interference between the upper and lower topsail yards, which are close together when the upper yard is down in its lifts. This situation can be corrected by adjusting the main lifts while slacking or rounding in (as necessary) the upper topsail sheets. Alternatively it may be corrected by adjusting the upper and lower main topsail sheets alone in such a manner as to bring the lower topsail yard parallel to the upper topsail yard.

Shortening staysails presents no particular problem. As previously stated, you normally work from top down in order to reduce the moment arm and ease the strain on the masts and rigging. In a strong wind some judgment is required to prevent heavy slatting and possible tearing of the sails. The halyard and sheet are eased off rapidly (but not allowed to run free) while the downhaul is hauled with a will. This brings the sail in quickly and well under control, with clew folded up to head. However it must be just right. If the halyard and sheet are eased too fast the sail will slat. If they are not eased fast enough the operation is unduly slowed and the men on the downhaul must engage in a tug of war with the men on the halyard and sheet, possibly tearing the sail. If you err, make it on the side of a too rapid easing of halyard and sheet. As with squaresails, do not worry about a smooth skin furl when working in high winds. Your object is only to smother and secure the sail as quickly and effectively as possible. Work from top down, never the reverse. Men on the leeward cranes be wary of bloomers.

D. MANEUVERING IN A HEAVY SQUALL

When the EAGLE encounters a sudden sharp increase of winds, as when passing through a squall, several things are apt to happen. If the wind is anywhere forward of the quarter, the vessel will increase its angle of heel. This will submerge the fuller lines of the lee bow, increase the forward lateral resistance, and tend to cause the bow to fly up into the wind. Quick action on the wheel may be required to avoid being caught aback. A decided lee rudder will be needed to hold the vessel on its course. This may leave little rudder in reserve for turning away and running off, should that become necessary. To ease this situation you will want to brail in the spanker at first opportunity. This will markedly reduce the pressure aft of the pivot point and make it easier to turn away.

If you can safely turn and run before a heavy squall, that is the thing to do. The wind velocity is reduced by the vessel's speed; the seas are following rather than ahead. You can shorten sail at your leisure and with safety, then turn and continue on your desired track. But it is not always safe to turn away. As noted above, you may have little residual rudder force to take you around. Thus the turn off wind may be painfully slow (particularly if you have not been able to douse the spanker). During this turn, the ship will come broadside to the full force of the wind. This will further increase the angle of heel and further decrease the effect of the lee rudder. The ship is then in a vulnerable position, subject to being knocked down''. This can be avoided, of course, if the Officer-of-the-Deck anticipates the squall and runs off before it hits full force. If he does not it may be better to hold the vessel on the edge of the wind until the worst of the squall passes. This requires expert helmsmanship. The vessel should be brought up into the wind only far enough to keep the driving squaresails trembling. At the same time the strain should be reduced by easing the staysail and headsail sheets and brailing in the spanker. If you let her go up too far she may fly up into the wind and be caught aback. If you don't take her up far enough to spill some wind she may heel dangerously and be "knocked down".

The best practice, of course, is to take appropriate action to either run off and/or reduce sail before you are struck by a heavy squall. An alert Officer-of-the-Deck can usually do this. Squalls seldom appear without warning. They can usually be detected both visually and by radar well in advance of the time they envelope the ship. The problem is that most squalls do not pack dangerously high winds, and it is difficult to distinguish those that do from those that don't. If you shortened sail and turned to run before every impending squall, you would have trouble making a schedule. This is another area, therefore, where judgment and an indefinable seaman's sense must prevail. If in doubt, shorten sail and/or run off before the squall hits. If not continue on, but be ready to ride the edge of the wind and to apply a large amount of lee rudder should that become necessary. Remember, if things really get tough you can spill a lot of wind in a hurry by throwing off the lee sheets. You may rip some sails and foul some running rigging by so doing, but you will ease the ship.

E. HEAVING TO

The object of heaving to is to allow the ship to ride out a heavy storm in the easiest possible manner. It is resorted to only when the wind and sea conditions have become so adverse that the vessel can no longer safely make good any distance in the desired direction. The most favorable hove to position is with wind and sea about 2 points forward of the beam, with the vessel at bare steerage way. In this position the vessel may roll substantially. But it will not roll dangerously, as it might if it lay in the trough. It will take some seas over the weather bow. But it will not pound or labor as it would if it were being driven up into wind and sea. Heaving to with wind and sea on the quarter allows the vessel to ride easily but is usually avoided because it requires close rudder control to avoid broaching situations. Broaching occurs when a following sea strikes the weather quarter at a time when the lee bow is submerged in a trough. This creates a turning moment which rolls the vessel to leeward and slews it around into the trough. Under extreme conditions it can be dangerous.

There are many ways of heaving to at dead slow speed with wind and sea forward of the beam. Which one you will use will depend upon many factors, including severity of existing weather, anticipated changes in the weather, the draft and trim of the vessel, the sails available, and (as always) the state of training of the crew. A typical combination for heaving to in this fashion would be to carry a flattened fore-topmast staysail and a sharply braced main lower topsail, then lash the wheel in a position such that the bow tends to go up into the wind. When the main lower topsail is full the vessel will surge slowly ahead. The rudder will take effect and swing the bow slowly upwind. The main lower topsail will first lift, then shake. The rudder will lose its effect. The bow will fall off to leeward under the pressure of the wind on the fore topmast staysail. The main lower topsail will fill again and the cycle will repeat itself.

This cycle may take anywhere from two to ten or fifteen minutes. The ship does not change heading much, nor does it even gather any appreciable amount of way. It rides easily, rising and falling with the seas. As noted, rudder control is usually unnecessary. The wheel can generally be lashed down and left unattended.

Other combinations of sail can be utilized to accomplish these same results. There is no fixed way of heaving to. However the principles involved and objectives sought are the same, regardless of the method used.

There are many security measures which should be taken prior to the time the weather is so bad that you must heave to. Lifelines must be rigged, boats must be secured with extra gripes and lashings, the ship must be placed in its maximum condition of watertight integrity, stores and gear must be firmly secured against shifting and banging about, free surface liquids must be eliminated to the maximum extent possible, all unnecessary personnel must be kept below decks, damage control gear must be in maximum condition of readiness, roving security patrols must be established, normal mess facilities must be shut down, etc. A stout and properly secured ship, hove to in a seamanlike manner, can survive storms of unbelievable intensity. It is the ill-found or improperly handled ships that get into trouble.

F. MANEUVERING TO RECOVER A MAN OVERBOARD

A man overboard emergency can happen at any time. The action to be taken to meet it must be quick, decisive, and correct. If it is not, the man will probably be lost. The Officer-of-the-Deck has a special trust imposed upon him to have himself and his watch team at all times organized and ready to take prompt and correct action with respect to this emergency.

In any man overboard situation it is essential at the outset to immediately (1) pass the alarm, (2) get floatation gear and lights/dye marker over the side, (3) keep the man in sight, (4) shift the DRT to 200 yards/inch and mark the bug, and (5) make appropriate signal to vessels in company. Simultaneously you must commence an appropriate recovery maneuver. If the ship is proceeding under power, the Williamson turn, 270° turn, or back-down methods may be used, depending upon existing conditions. A boat is launched and recovery is effected in the usual manner. In extremely heavy weather it may be preferable to lay the vessel to windward of the man, drift down on him, and take him directly back on board using scramble nets, swimmers, rescue harness, as appropriate, etc.

When sailing the problem of maneuvering for recovery is more complicated. Your objective is to slow the vessel down sufficiently to launch a recovery boat in the least possible time, without unduly endangering the vessel. Normally this is accomplished by deliberately throwing the vessel all aback, launching the boat, and thereafter hauling either fore yards or main yards. This will cause the vessel to drift in the trough with the wind either funneling through or wedged out by the oppositely branched squaresails on foremast and mainmast. The spanker should be brailed in and the staysails run down before the vessel is hove to in this fashion.

Whether to haul the main yards (MAINSAIL HAUL) on the fore yards (LET GO AND HAUL) will depend upon how readily the vessel has come up to windward. If she comes head to wind or nearly so without losing her way, execute MAINSAIL HAUL, just as you would in tacking. Unlike tacking, do not thereafter execute LET GO AND HAUL. Instead let the vessel fall off on the new tack and take up a position broadside to the wind. It will then drift down toward the recovery boat and the man, with the wind wedging out between the oppositely braced main and fore sails. On the other hand it appears that the vessel will be dead in the water before coming head to wind, it will be better to box her off on the same tack by executing LET GO AND HAUL. This will cause the vessel to fall back rapidly on the original tack into the trough. Here again it will drift back toward the scene with wind wedging through the oppositely braced yards.

The most important part of the operation (after the initial action) is to get the recovery boat cleared away without undue delay. All else is secondary to this. It is not particularly significant if you are unable to haul your main yards or haul in the spanker or run down the staysails promptly. Except in high winds, the ship can usually extricate itself from a fouled-up sail situation, without damage or harm. But a delay in launching a recovery boat may result in loss of the man who is overboard. In essence, then, the basic rule for the Officer-of-the-Deck who has only the watch on deck at his disposal is to throw the ship up into the wind and clear away one of the boats. By the time this is done MAN OVERBOARD stations will be manned and hands will be available for appropriate sail handling action. It goes without saying, of course, that engine power should be provided as soon as possible without specific request. The ship will want all possible advantage when maneuvering to recover a man overboard.

G. TRIMMING SAIL

Keeping the sails of EAGLE properly trimmed is an art. An alert watch which pays close attention to trim can make as much as ten miles more than a watch which is careless in this regard. It should be a point of pride with each Officer-of-the-Deck to keep his sails trimmed to maximum advantage at all times. In sailing ships, this is one of the hallmarks of competence.

The most obvious situation with respect to proper trim is when the ship is sailing directly before the wind. It is manifest here that the maximum propelling effect will be realized by bracing the yards square and trimming them parallel to the horizon. Staysails and headsails will not draw; hence they will normally be down. Square sails on the foremast will be blanked to a considerable extent by those on the main mast. To reduce this blanking effect it may be well to "soft sheet" the main sails or even take the main course up in its gear.

The most complex situation with respect to trim is when the ship is sailing hard on the wind. Here you will want the yards braced up as far as they will go and still draw effectively. The extent to which the yards may be braced up is limited by the rigging. To have all sails drawing to maximum advantage generally requires a fan, i. e., the upper yards braced progressively further in than the lower ones. The reason for this cannot be explained in simple terms. However, it can be demonstrated in terms of solid geometry. The amount of fan required is a function of the angle of heel. If there is no heel, no fan is needed. The sails will draw to maximum advantage with all yards braced to the same angle (i. e., "stacked" one above the other). As ship heels over, however - and it always will when wind is present - the upper yards will take on a different angle with respect to the apparent wind than the lower yards. To compensate for this, the upper yards must be progressively braced in, each a little more than the one below it. Let us call this "natural fan". The greater the angle of heel, the greater the required natural fan to keep all sails drawing to maximum advantage. In 15 to 20 knot winds, it may amount to as much as 1/4 point per yard. In other words, to maintain a common and optimum angle between the apparent wind and the sails, each higher yard must be braced in approximately 1/4 point more than the one below.

It is often desirable to superimpose an additional amount of fan on this required natural fan, even though this may diminish slightly the efficiency with which the uppermost sails are pulling. The additional fan is for telltale purposes alone. It serves to give warning when the vessel is coming too close to the wind. The royals and topgallants, being braced in more than the topsails and the courses, and more than that required for natural fan, will start to lift before the topsails and courses. This will warn the Officer-of-the-Deck to fall off a bit. It allows a margin of steering error and reduces the likelihood of the ship accidentally being caught aback.

In addition to being properly braced, yardarms must be properly trimmed, i. e., kept parallel to the horizon. This is done by adjusting the lifts, while easing or hauling on lee sheets and weather tacks, as necessary. Being tied together by the sails, the yards will move as a unit. If the forward ends of the yards are allowed to point up too much, the after ends will come up against the backstays sooner than necessary and the vessel will not be able to sail as near to the wind as it otherwise could. If the forward ends of the yards are allowed to droop, the leeches of the sails will not set properly and maximum airfoil effect will not be realized. As the angle of heel changes, both trim and fan requirements change. It is thus apparent that close attention is required to keep the vessel sailing to maximum advantage when close hauled.

The principles discussed above continue to apply, but in progressively lesser degree, as the wind draws aft. Since the angle of heel will be less, the required amount of natural fan will be progressively reduced. The vessel now being off the wind, no superimposed fan will be required. As a general rule yards are stacked rather than fanned when the wind draws abaft the beam. As the wind draws aft, the angle between the apparent wind and the sails should be kept somewhat greater than the angle between the sails and the keel until such time as the ship is running directly before the wind, at which time each of these angles should be 90°. Whenever yards are braced substantially, either up or in, lifts will have to be adjusted to maintain the desired parallelism between yards and horizon.

Since fore and aft rigged vessels can lie within four points of the wind, it is never necessary to trim EAGLE'S headsails, staysails, and spanker flat. These sails should always be somewhat free when the square sails are braced up sharp. In general they should be trimmed so they are just full. Determine this point by easing the sheet until the sail shakes - then walk aft the sheet until the sail just draws. Trimming fore and aft canvas too flat is a common cause of speed loss. It produces leeway at the expense of headway.

APPENDIX I

GROUND TACKLE

A. ANCHORS

2 Patent (Dunn)	3800 lbs each	Bower anchors
1 Old fashioned	770 lbs	Kedge anchor - stowed on quarterdeck

B. CHAIN

Starboard chain	152 fathoms
Connecting shot	3.5 fathoms
Swivel shot	1.7 fathoms
Total length	<u>157 fathoms</u>

Port chain	138 fathoms
Connecting shot	3.5 fathoms
Swivel shot	1.7 fathoms
Total length	<u>143 fathoms</u>

Both chains are the ones that came with the vessel from Germany. They are 1.77" (45mm) wire diameter wrought iron stud link chains.

C. MARKINGS

The chains are marked according to the normal Coast Guard system in 15 fathom shots. The first shot is measured from the jew's harp and includes the bending and swivel shots.

Though marked in 15 fathom shots, the chain is not made up in the standard 15 fathom shots. It is made up in the European system of 25 meter shots. (13.8 fathoms) The shots are connected with the older style Kenter shackles. These Kenter shackles are painted white in order that they may be identified should the need arise to break the chain.

GROUND TACKLE OPERATION

A. WINDLASS

The anchor handling machinery consists of a capstan coupled through a positive clutch to either the port or the starboard wildcats. The gears and shafting for this arrangement are all below deck. The clutch control is located between wildcats. Each wildcat has a band brake controlled by a hand-wheel abaft the individual wildcat.

In addition to the clutch located between the wildcats which selects which one is to be engaged to the capstan, each wildcat has a clutch of its own in order that it may be allowed to run freely or be connected to the capstan for heaving. Part of the complexity of these power trains is due to the fact that prior to 1954, the

capstan was hand powered only. It is still possible to disengage the electrical motor through the use of yet another clutch and operate the capstan by hand.

Chain stoppers consisting of several chain links, a turnbuckle, and a pelican hook are provided for each chain. These chain stoppers are shackled to the deck and attached to the chain forward of the wildcat. They are used to secure the anchor for sea, for holding it when it is made ready for letting go, and to hold the anchor in the hawse in case the need arises to unshackle the chain from the anchor. Immediately forward of the chain stoppers are two chain pawls. These are safety devices that would come into use should a chain stopper or the brake fail. The capstan is equipped with pawls. These are what a landsman might call ratchets. They were of considerable importance when the capstan was hand powered as they would insure that the capstan could not inadvertently be operated in the wrong direction. Now that the capstan is normally operated by power and it is desired to operate it in both directions, it is necessary to insure that the pawls are in the UP position.

B. PREPARING TO BRING THE SHIP TO ANCHOR

When the word is passed to prepare to bring the ship to anchor the First Lieutenant, who is in charge on the forecastle, will muster his anchor detail. He will ascertain whether the port or starboard, or both anchors are to be used. If not previously done he will request that the engine room provide power on the anchor windlass. The quarterdeck should have notified the engine room previously of the time of anchoring. Both anchors will always be made ready for letting go. He will in addition receive any special instructions and may also be advised as to the depth of the water.

It is very rare that a person has a reason to be in the chain locker however, it is mandatory that the First Lieutenant ascertain that no person is in the chain locker. It is also wise to cause an inspection to be made of the chain in the bin to insure that no foreign objects are fouled in the chain.

If anchor buoys are to be used, the buoy of the appropriate green or red color is bent to the anchor. Sufficient scope must be used on the buoy line to insure that it will float, however it should be short enough to insure that it will float nearly over the anchor.

The capstan is then engaged to the wildcat of the anchor being prepared for letting go. A light strain is taken on the chain and at the same time the brake is backed off. An additional strain is taken on the chain if necessary and until it is possible to raise the chain pawl. The brake is then set up taut and the capstan stopped. The pelican hook of the chain stopper is moved back two links and re-attached. The direction of the capstan is reversed, the brake eased, and the chain "walked out" until the strain comes on the stopper and there is slack between the chain stopper and the wildcat. The capstan is stopped and the brake again set taut and the clutch of the wildcat disengaged. Two links of chain have been backed out so it is known that the anchor is not jammed in the hawse and all that is holding it is the chain stopper and the brake. (It may be that the anchor has been ordered walked out to the waters edge or when anchoring in deep water, even further. The same process is used except that of course the distance is greater than two links.)

C. LETTING GO

When the ship nears the desired anchorage point, the word is passed from the quarterdeck to "Stand clear of the starboard (port) chain". The First Lieutenant orders the brake released, orders all hands abaft the wildcats, and orders the pin removed from the retaining bail of the pelican hook on the appropriate chain stopper. At this point the First Lieutenant will normally be advised as to the desired scope of chain and whether this will be measured "on deck" or "at the water's edge". This scope will be an integral number of shots and will be expressed as "15 fathoms on deck" or "75 fathoms at the water's edge", etc.

When the ship comes to the desired spot the command is given from the quarterdeck, "Let go the starboard (port) anchor". This command must be executed without delay. It is to be recalled that the only thing holding the anchor is the chain stopper. The retaining bail of the pelican hook is knocked clear with a maul and the anchor runs clear. The Damage Controlman whose duty it is to tend the brake, will allow the anchor to run freely until it touches the bottom at which time he will set up a few turns on the brake to prevent the chain from overhauling itself and piling up on the bottom. If the ship has been properly handled, it will have a slight amount of sternway (or perhaps headway if brought to anchor under sail) and the chain is allowed to run out to the desired scope at which time the brake is set taut. All during this time the First Lieutenant makes reports to the quarterdeck relative to the direction the chain is tending and the amount of strain on the chain. When a good strain has come on the chain and then the chain gone slack and the First Lieutenant is satisfied that the anchor has taken a good bite in the bottom, he reports "Anchor brought to and holding". Unless it is desired to add to the scope (veer chain) or shorten the scope, the anchor detail will normally be told to secure. The chain stopper is passed. The brake is backed off so that the strain may come on the chain stopper and the chain between the wildcat and the stopper goes slack. The brake is then set taut and the pawl dropped. No strain should come on the pawl as it is merely a safety device should the chain stopper fail. If some of the strain were allowed to come on the pawl and it was later desired to veer chain, it could not be accomplished until the chain was heaved in to release the strain and raise the pawl.

D. WEIGHING ANCHOR

Prior to weighing anchor the engine room must be notified in order that they may insure sufficient electrical power is available to operate the capstan and so that they may insure sufficient pressure on the fire main to wash the chain and anchor as it is heaved in.

When the anchor detail is set and prior to heaving in and weighing anchor the First Lieutenant must check the following details:

1. Insure that sufficient personnel are available.
2. Insure that the vertical shaft to the electrical motor is connected. (The clutch is located in the cadet washroom and is normally left engaged but failure to check this could prove embarrassing)

3. Insure that the selector clutch is engaged to connect the capstan to the wildcat. (The capstan is to be run in each direction to check and insure its operation before the wildcat is actually engaged)
4. Insure that the wildcat clutch is engaged.
5. Rig one or more fire hoses to wash the anchor and chain as it is heaved in.
6. Insure that no person or foreign object is in the chain locker.

When all of these things have been done the First Lieutenant reports "Ready to heave around". (Note that rotating machinery is used and that 'heave around' is proper here.) When ordered to "Heave around", the capstan is started and the brake is backed off a few turns. When the chain stopper goes slack it is knocked clear and the brake backed off all the way. The pawl remains down and rides over each link as it is heaved in. This is a safety feature should something happen to the wildcat. As the anchor is being heaved in the First Lieutenant makes reports relative to the direction the anchor is tending and the amount of strain on the chain. When the anchor comes to short stay (when all slack chain has been heaved in and the shank of the anchor is just about to be lifted from the bottom) the First Lieutenant orders "Avast heaving" and reports the anchor at short stay. Should there be any delay in any of the other preparations for getting underway, there is still time as the vessel is still (barely) anchored. When all is in readiness the First Lieutenant will be ordered to "Break out the anchor". Heaving in is resumed. When the chain is nearly straight up and down and a considerable strain comes on the anchor windlass, the anchor is reported as "Up and down". As soon as the anchor breaks out, the anchor windlass will speed up and the report "Anchors' s aweigh" is made.

Next will come the order to house the anchor (heave it into the hawse pipe). The anchor is heaved all the way in, the brake set taut and the capstan stopped. Great care must be exercised here as a severe strain can come on the anchor windlass and if allowed to continue for more than a second, it can do great damage. When the brake has been set taut the chain stopper is passed. Unless orders to the contrary are received, the anchor is again made ready for letting go and remains ready until the special sea detail and the anchor detail are secured. When they are secured, the anchors are made ready for sea and the engine room advised that the capstan is secured.

If, when the anchor approaches the hawse pipe, both flukes are pointed inboard, they will usually slide up the side in that position and press on the skin of the ship as the shank starts to enter the hawse, thus threatening to puncture the side and preventing the anchor from being fully housed. To "trip the flukes" so they point outboard, a bight of line must be lowered over the anchor and brought up snug under the flukes and each end secured on deck. The anchor is then backed out. As it is lowered the line keeps the flukes up tending to pivot them and finally they will flop over and point outboard. With the flukes tripped into their normal position, the line is brought back aboard and the anchor housed as described above.

APPENDIX II

A. BENDING A SQUARE SAIL

The sail is stretched along the deck, after side down, and the head is stretched well out. The sail is then gathered up as in furling and gaskets passed snugly around it, taking care to leave the boltrope at the head and foot clear. The leech cringles for sails with leechlines must also be exposed.

A gantline is then passed around the center of the sail and it is swayed aloft to the yard where it is to be bent. It is hoisted far enough above the yard so that the men on the yard can grasp it by the head cringles and fleet it out along the yardarms as the gantline is eased off. As soon as possible, the head earring is taken through its eye on the end of the yard and brought back through the head cringle, this then serves as a tackle to help extend the head of the sail. The sail is hauled well out with the head cringles, as the gantline is further slacked away, until the special hooks on the yardarms can be passed through the head cringles. The sail is now carefully centered on the yard and the center roband is passed and secured. An additional turn is now taken with the head earring, or in case of the lower sails a jigger is hooked into the head cringles, and the roping along the head of the sail put on a good stretch, after which the head earrings are secured and the remaining robands are passed around the jackstay. Sheets, clewlines, leechlines, and buntlines are now bent to the sail and it is ready for setting. In bending the gear, considerable care and foresight is necessary to avoid turns and to insure that everything will run fair when the sail is set. If the sail is first set in blowing weather, any fouled gear may result in serious trouble. If the sail is being bent in harbor, it is let fall and then furled with the gear to insure that everything is properly led and bent.

B. BENDING A FORE AND AFT SAIL

A fore and aft sail is made up along the foot and swayed out or up to the stay upon which it is to be bent. The halyard and downhaul are bent into the head cringle, and the tack is made fast to insure that the sail will not be lost. The luff of the sail is then bent to the hanks on the stay, starting at the head and working down. In harbor, or in fair weather, this may be accomplished most easily by running the sail partly up the stay as the robands are passed on the individual hanks. The sheets are shackled to the clew cringle and the sail is ready to go to work.

In bending sail and in working on sails at night, always bear in mind that the bolt rope is on the after side of the square sails and on the port side of fore and aft sails. If this fact is given proper consideration, it is easy to avoid unnecessary turns and snarls.

APPENDIX III

CONDITIONS OF CLOSURE; WATERTIGHT INTEGRITY

BUOYANCY and STABILITY are two essential attributes of any ship and they must be preserved if she is to continue to float and to sail. These attributes are provided by the construction of the vessel in numerous compartments with watertight boundaries and by the proper distribution of weight.

Leakage of water into a compartment that is designed to be dry will diminish buoyancy and it is likely to have an adverse effect upon stability by introducing weight at the wrong place.

A prime objective in ship construction is therefore watertightness of boundaries. Ideally, all boundary surfaces would be continuous with no possible sources of leakage - there would be no doors, hatches, portholes, vent ducts or cable runs through bulkheads. But there must be access, and habitability demands ventilation. So we have to compromise between watertight construction and usability. We cut the watertight boundaries to provide the necessary access.

Still, the ship must be capable of being made watertight to take care of such possibilities as collision or grounding. Water that might accidentally enter the hull must be prevented from flooding progressively from one compartment to the next. In order to retain watertightness in boundaries where openings have been cut, each fitting is provided with a watertight closure.

If all fittings were closed the ship would be watertight, but there would be no access. It would be possible to maintain a high degree of watertightness (watertight integrity) if only one door were to be opened with a man posted to close it again immediately if needed.

A relatively high degree of watertight integrity would be maintained if only a few fittings were to be opened under these same circumstances.

Each such opening would reduce the total watertight integrity somewhat and to have knowledge of the extent to which it has been diminished, there must be a record of what fittings are open. The watertight integrity maintained in a vessel at a particular time is called its material condition.

While this procedure maintains good control on watertightness it is more restrictive than is needed during the working day in fair weather. Under these circumstances it is reasonable to keep frequently used access doors open at all times because suitable people are up and about and nearby the fittings to close them quite promptly in case of accident. On the other hand, at night when everyone is turned in, it may be both (or either) unnecessary and imprudent to leave a particular door open.

There are three different standard Material Conditions which may be prescribed for the Eagle (or any other Navy or Coast Guard vessel) depending upon the degree of watertight integrity that must be maintained.

These are:

1. Material Condition X-Ray - the most relaxed condition. Suitable for fair weather, daytime, in port, etc.
2. Material Condition Yoke - An intermediate condition.
3. Material Condition Zebra - The most secure material condition in which the ship can continue to operate. Suitable for foul weather, at night, under attack, etc.

In order to determine what fittings are to be open or closed in each of the material conditions, each closure is classified according to its function and importance. A letter X, Y, Z, or W, indicating the classification is attached to each fitting and the following closure table applied:

MATERIAL CONDITION	CLASSIFICATION			
	X	Y	Z	W
XRAY	Closed	Open	Open	Open
YOKE	Closed	Closed	Open	Open
ZEBRA	Closed	Closed	Closed	Open

This system applies to every military vessel. Special instructions may be issued in individual ships to provide for modification of conditions, darkening ship, battle access or temporary air tightness.

Whenever it becomes necessary to open a fitting which is supposed to be closed according to the material condition in effect, permission must be obtained from the OD. When requesting permission, give:

1. Name and rank/rate of person making the request
2. Type of fitting
3. Number of fitting
4. Classification of fitting
5. Reason for request

When permission is given to open, this information is logged in the Closure Log, together with the time. YOU MUST REPORT THE CLOSURE PROMPTLY. This also is logged, and if you have failed to report closure in a reasonable time, you will be called to task.

APPENDIX IV

DAMAGE TO RIGGING - EMERGENCY MEASURES

1. IF THE SHEET OF A SQUARE SAIL CARRIES AWAY: - Haul up on the clew-lines and buntlines; then lower the yard (if the yard is hoisted by a halyard); haul taut the weather brace; repair the sheet and reset the sail. (NOTE: Do not lower the yard until the gear is hauled up as by keeping the yard up, there is less to knock about.)
2. IF A BRACE CARRIES AWAY: - Fall off before the wind so that the opposite brace will take most of the strain and repair the damage. If necessary, take in sail.
3. IF THE SHEET OF A HEAD SAIL CARRIES AWAY: - Run the ship off a point or two and haul down as quickly as possible; bend on a new sheet and reset the sail.
4. IF THE DOWNHAUL OF A STAYSAIL CARRIES AWAY: - Let the ship fall off so as to blanket the staysail in the lee of the square sails if possible. Then try to haul down the staysail by hand, but if the weather is so bad as to make this impossible, send a man aloft with a line which will be tied loosely about the stay and slide it down until it catches the head of the staysail. With this line, the sail can be hauled down.
5. IF THE FORE OR MAIN YARD LIFT CARRIES AWAY: - Under these circumstances, the lower topsail sheet will probably carry away also. The topsail should be secured; the yard braced against the lower rigging; and a new lift and sheet reeved as soon as possible.
6. IF A BACKSTAY OR A SHROUD CARRIES AWAY: - Tack or wear as quickly as possible so as to bring a strain on the old lee rigging. Then repair the damage or run a preventer. Should the shrouds on both sides of the ship become slack, and it is impossible to take them up by means of the turnbuckles, lash a spar on the outside of the rigging on both sides and pass a line from one spar to the other, heaving up tight on this line.
7. IF A BOBSTAY CARRIES AWAY: - Get the ship before the wind, reduce sail to ease the speed. Get a length of chain and pass each end out through the hawse pipes; shackle the ends of the chain to the end of the bowsprit and lead to the capstan and set tight.
8. IF A STORM SAIL BLOWS AWAY: - Lash a tarpaulin in the shrouds in such a position as to maintain the required sail balance.
9. IF A TRUSS OR SHOE CARRIES AWAY OR BREAKS: - Lay the sail aback, thereby binding the yard against the mast, and repair the damage.
10. IF A SPAR CARRIES AWAY ALOFT: - It will be necessary to immediately relieve any other spars or braces that depend upon the broken member for support, and also to get the broken spar down as quickly as possible, as it will do considerable damage if allowed to bang about. If any of the spars should bang over the side and endanger the ship by banging against the hull, and should the weather be too bad to permit saving them, they should be cut away at once.

APPENDIX V

PROCEDURE FOR HOUSING TOPGALLANT MASTS

The masts and rigging of the EAGLE are designed to permit housing the main and fore topgallant masts when reduction of mast height is necessary. Housing of these masts is necessary if the EAGLE is to clear the many bridges. The following is a brief description of one way in which this operation can be conveniently and easily carried out. The description is given in terms of the mainmast only. With minor variations, however, it is equally applicable to the foremast. Approximately three hours should be allowed for the job. The rigging work can be handled by eight capable men, if they are properly instructed and organized in advance.

The first part of the operation is the unshipping of the topgallant yard from its track on the topgallant mast, and securing it on the topmast cap. All sails are furled and the yards are in the lifts before this operation is started. It is accomplished as follows:

1. Detach the royal clewlines from the sail and secure them around the outer ends of the topgallant yard to serve as temporary lifts.
2. Fit a large shackle around the main topgallant stay at deck level, and shackle in a light tackle. Secure the main topgallant staysail halyard and downhaul to this shackle also. Using the halyard and downhaul, run this tackle up the stay and secure the movable block to the center of the topgallant yard by means of a strap. Adjust the position of the fixed block on the fixed block on the stay so that it is approximately opposite the topgallant yard. Lead the hauling part of the tackle to the crosstrees or to the deck.
3. Transfer the weight of the topgallant yard from the lifts to the halyard by taking a short pull on the halyard, slacking clewlines and sheets as necessary, and setting up on the royal clewlines which now act as jury topgallant lifts.
4. Unshackle the topgallant lifts at the mast, and tie off the ends to the center of the topgallant yard.
5. The topgallant yard rides up and down on a track on the forward side of the topgallant mast. It is secured to this track by means of a shoe attached to the yoke of the yard. The shoe is attached to the swiveled part of the yoke by means of a through-bolt pin. Set up moderately on the tackle you have rigged on the topgallant stay, and remove this shoe-pin. The yard is now clear of the mast, suspended by the halyard, steadied by the royal clewlines and the topgallant braces, and held away from the mast by the tackle on the topgallant stay. It will be necessary to remove the topgallant shoe from the track and send it down with a gantline.
6. Settle the topgallant yard down to a point opposite the topmast cap by slacking off on the halyard, steadying it as necessary. It is necessary to tend topgallant braces at this time, otherwise it will be impossible to move the yard

forward. It will be necessary to keep the royal sheets slack during this operation. Now adjust the position of the yard carefully so as to enable the end of the yoke swivel (which originally was pinned to the shoe) to slide in between the two projecting lugs on the forward side of the mast cap. When in position, insert a through-bolt, securing the yard to the topmast cap. (NOTE: This securing arrangement is similar to the gudgeon-pintle arrangement for securing a rudder.)

7. Slack off the topgallant halyard, allowing the weight of the yard to be taken by the topmast cap. Unshackle the wire tye from the yard. Haul this tye out of the mast sheave through which it leads, and secure it to the crosstrees.

The topgallant yard now being housed on the topmast cap, you are ready to commence the second part of the operation - the actual settling of the topgallant mast. The total weight which you will be handling in this operation is not as much as you might expect. The topgallant mast itself weighs 2128 pounds and the royal yard 884 pounds. Adding the weight of the royal and the rigging, the total is still less than two tons.

The topgallant mast extends through a heavy steel ring which is the topmast cap, down through the hole between the crosstrees and the trestle trees. Its weight is transferred to the trestle trees by means of a heavy steel fid which goes through the topgallant mast athwartships near its base, and rests on the trestle trees. Additional support for the topgallant mast is provided by the topgallant shrouds, two stays, and six backstays. When we settle this mast, we lower it as far as it will go through the cap ring and the hole between the crosstrees and the trestle trees. In order to lower it, however, we must first raise it slightly to permit the removal of the fid. Proceed as follows:

1. Two heavy padeyes are provided on the sides of the topmast cap, one on each side. Shackle a large snatchblock into the padeye that is on the same side of the mast as the upper topsail halyard purchase.
2. Detach the upper topsail halyard from its three-fold purchase, holding the block aloft by gantline. Tie the halyard in to the mast.
3. Rouse out the "mast rope", a long 3/4" wire pendant designed for this operation, and shackle one end of it into the three-fold purchase.
4. Sway the bitter end of the mast rope aloft to the crosstrees by means of a gantline. Reeve it through the snatchblock on the topmast cap, back down through the sheave which is installed athwartships in the topgallant mast near its base, thence back up to the cap, where it is shackled into the second padeye.
5. Slack off on all stays and shrouds which support the topgallant mast. This is done by backing off a few turns on the turnbuckles, using a bar. Slacking these stays is necessary in order to permit raising the topgallant mast enough to remove the fid. Only a small amount of slack is necessary.
6. Remove the mast wedges.

7. Lead the hauling part of the three-fold purchase forward to the capstan by means of a snatchblock on deck and the roller chocks on the forecastle. Get power on the capstan and set taut.
8. Pull the upper topsail tye chain athwartships and clear of the topsail track by means of a jigger, to permit unobstructed downward travel of the topgallant mast.
9. Hoist the topgallant mast very carefully a slight amount by heaving around on the capstan. This takes the weight off the fid, and permits its removal.
10. Attach a safety line to the starboard end of the fid and haul it from the same side until it is out of the slot in the mast.
11. Commence settling the topgallant mast by backing off slowly on the capstan. Men aloft keep the slack shrouds and rigging clear of the mast. It will be necessary to keep the slack out of the temporary lifts to prevent the topgallant yard from cockbilling while the mast is being lowered. Settling continues until the topgallant hounds fetch up on the mast cap ring - a total distance of 14 feet 9 inches.
12. Belay the upper topsail halyard on its proper pin at the pinrail. This helps support the topgallant mast and prevents it from settling further.

NOTE: If it is the intention to brace the yards, and they must be braced to go through the bridge, house the fore topgallant mast first and brace it up on port tack if going South through the bridge, and on the starboard tack if going North; after which the main topgallant mast may be housed. It is absolutely essential that this procedure be followed because any bracing of the fore yards after the main topgallant mast is lowered will only cause the fore royal braces to foul on the main topgallant sail.

Special Gear Required:

- Shackle
- Mast Rope
- Large Steel Snatchblock
- Deck Snatchblock
- Tools
- Tackle
- Gantline

APPENDIX VI

LOWERING AND HOISTING OF SMALL BOATS

The lowering and hoisting of small boats from the EAGLE is an evolution which can lead to situations of potential danger. It is therefore imperative that silence be maintained by all hands except the person in charge of the lowering and hoisting detail. Any instructive criticism will be given after the boat is waterborne or secured for sea, or at any time that safety for the boat or crew is jeopardized.

A. LOWERING

The boatswain mate in charge assures that all men assigned are present, and that all gear is available such as fenders, snatch blocks and necessary tools. The BM sees that the boat falls are faked out for running and that the boat crew dons lifejackets.

When the word is passed to lay in the boat the coxswain assigned will insure that the boat plug is in place, rowlocks and oars are ready, men are seated and holding on to the lifelines and that the steering oar is shipped. He then reports to the BM "ready in the boat".

When the BM has received the word from the Officer of the Deck to lower the boat, he will give the command "Cast off the gripe". THE BOATSWAIN MATE IN CHARGE OF THE LOWERING DETAIL IS NOW IN COMPLETE CHARGE UNTIL THE BOAT IS WATERBORNE.

At the command "Standby to lower away" the men tending the falls remove all turns from the cleat with the exception of one round turn and half figure eight. The BM then asks the men on the falls if they are ready and if he received "Ready forward" and "Ready aft", the command "Lower away together" will be given and the line payed out so that the boat is lowered on an even keel.

WITHOUT EXCEPTION EVERY MAN IN THE BOAT CREW WILL KEEP HIS WEIGHT ON THE LIFELINES (manropes) UNTIL THE BOAT IS WATER BORNE.

During the lowering, if one end is being lowered faster than the other, the command "Avast forward/aft" is given. The opposite end continues lowering until the keel is again even when the command "Lower away together" is given. When the boat is a few inches from the water the command "Let fall" is given (This command must be given on the down roll), and the remaining turns are then thrown off the cleats on the davits simultaneously.

THE COXSWAIN OF THE BOAT THEN TAKES OVER AND COMMANDS "UNHOOK AFT". AS SOON AS THE AFTER FALLS ARE UNHOOKED IT IS REPORTED TO THE COX, WHO THEN COMMANDS "UNHOOK FORWARD". AS SOON AS THE FORWARD FALLS ARE UNHOOKED AND REPORTED TO THE COX, HE THEN REPORTS TO THE BM THAT THE BOAT IS UNHOOKED AFT AND FORWARD. (This is the most critical step in the operation and must be performed smoothly, accurately and without delay).

The boat, once it is free from the falls, can ride the sea painter until the coxswain commands "Cast off the sea painter".

Once the boat is free from the falls the BM on deck begins preparations for receiving the boat alongside again. The falls are overhauled and hogged into the side of the ship. The sea painter is made ready for passing and the hoisting detail takes their assigned stations.

The falls are laid on deck by the lowering detail as follows: The forward fall is led through the snatch block at the heel of its davit, across the deck to the opposite forward davit through the snatch block at that heel, forward through the rolling chock on the forward part of the quarter deck, and across the waist to the fairlead roller on the after bulkhead of the laundry. The after fall is through the snatch block at the heel of its davit, forward through the rolling chock to the fairlead roller on the after bulkhead of the laundry.

B. HOISTING

When the boat has been recalled, it comes alongside and the sea painter is passed UPON THE COMMAND OF THE COXSWAIN "Pass the painter" (never pass the seapainter until commanded by the coxswain). Upon receiving the painter it is made fast to the inboard thwart by two round turns and the bitter end is married to the standing part of the painter. The boat is then sheered alongside under the fall and the Coxswain gives the command "hook forward" as soon as the forward block is hooked it is reported to the coxswain, who then gives the command "Hook aft" as soon as the after block is hooked it is reported to the coxswain who passes the word to the BM in charge of the hoisting detail "Hooked fore and aft". AT THIS POINT THE BM ON DECK ASSUMES COMMAND AND COMMENCES HOISTING OPERATION.

The falls are "set taut" and the command "Haul away together" is given (if power is used the command "Heave around together" is used). The same rule applies to the men holding on to the life lines as when being lowered. The boat should be brought up on an even keel and in the case of one end of the boat being higher than the other the same command should be given as in lowering to correct same.

When the gunwhale is even with the deck railing the command "Avast hauling" (or heaving if deck wench is being used) is used. Upon command the men lay out of the boat, making sure the boat is kept trim. As soon as the men are out of the boat the command "Pass stoppers" is given. When stoppers have been passed this is relayed to the BM that "Stoppers have been passed fore/aft". The command "Back easy forward/aft" is given, if stoppers are holding, so inform the BM by replying "Stoppers holding fore/aft". If stoppers are holding the command "Up behind" will be given. The falls are belayed on the cleats with a round turn, two figure eights and a weather hitch. If the stopper is not holding "Set taut" will be given and stopper repassed properly. After the falls have been belayed, the gripe is passed and made up securely. All gear is restowed and lines made up.

C. PASSING THE STOPPER

The proper way to pass a stopper is as follows:

Take a half hitch on the standing part of falls against the lay, pass the bitter end of the stopper back through the half hitch and pull upwards to lock, then snake the rest of the stopper around the standing part with the lay and hold with your hands.

APPENDIX VII

RIGGING AND OPERATION OF THE CARGO BOOM

The primary use of the cargo boom on the EAGLE is for launching and retrieving the personnel boat and the Admiral's barge which are located in chocks on the port and starboard side of the boat deck.

A. RIGGING

The rigging of the cargo boom is quite simple but a great deal of care should be taken to insure that all gear is properly selected and installed in the prescribed manner, as we are handling great amounts of weight and no unnecessary chances are ever to be taken. The following gear is required:

Bull Chain	Two (2) Wire Guy Pendants (Vangs)
Nylon Topping Lift Purchase	Four (4) Snatchblocks
Wire Topping Lift Pendant	Main Purchase
Two (2) 2-fold Purchase Guys	Extra Tackle
2 Legged Hoisting Sling	

Prior to hoisting, it is necessary to shackle all gear on the boom, main purchase, port and starboard guys (vangs) and topping lift.

Shackle in the bull chain and the topping lift purchase on the mast end of the pendant and then haul the topping lift pendant out to the boom.

Rig a stout (extra) tackle between the main yard yoke (use a strap) and the fishplate on the topping lift, and hoist the topping lift purchase and the bull chain aloft while hauling the boom end of the topping lift pendant out to the boom. This is necessary because of the weight of the pendant plus the fishplate and the bull chain.

When the pendant is shackled in the end of the boom, the boom can be topped up by rigging the hauling part of the topping lift purchase through a snatchblock and forward in the waist. Tend the port and starboard guys to keep the boom clear of the main stay.

When the end link of the bull chain is shackled into the chain plate at the foot of the mast, the boom is just the right height to pick up the boats. The topping lift purchase can then be slacked. The boom is then ready for operation.

B. OPERATION

Assuming that the cargo boom is completely rigged, the following steps are necessary to put either power boat into the water from EAGLE'S deck:

The boom is centered over the chosen boat through the use of vang. By easing one of the vang the boom is permitted to be moved athwartship by hauling the other vang. When this has been accomplished, the sling is shackled to the hoisting eyes of the boat. Insure that the short leg of the sling is secured to the heavy end

CARGO BOOM RIGGING

PORT & STARBOARD
GUYS SHACKLE ON
HERE (BOTH SIDES)

BOOM

TOPPING LIFT
PENDANT

MAINMAST

FISHPLATE

BULLCHAIN

TOPPING LIFT
PURCHASE

CHAINPLATE

LEADS FORWARD TO CAPSTAN
WHEN HANDLING HEAVY LOADS; TO
WAIST DECK WINCH WHEN
HANDLING LIGHT LOADS

FORWARD TO CAPSTAN

of the boat; usually the stern. Since these boats usually are not removed from deck when a sea is running, the "O" ring of the sling is shackled to the main purchase. Steadying lines are attached to both ends of the boat, and two or three boat fenders are placed along the inboard side of the boat.

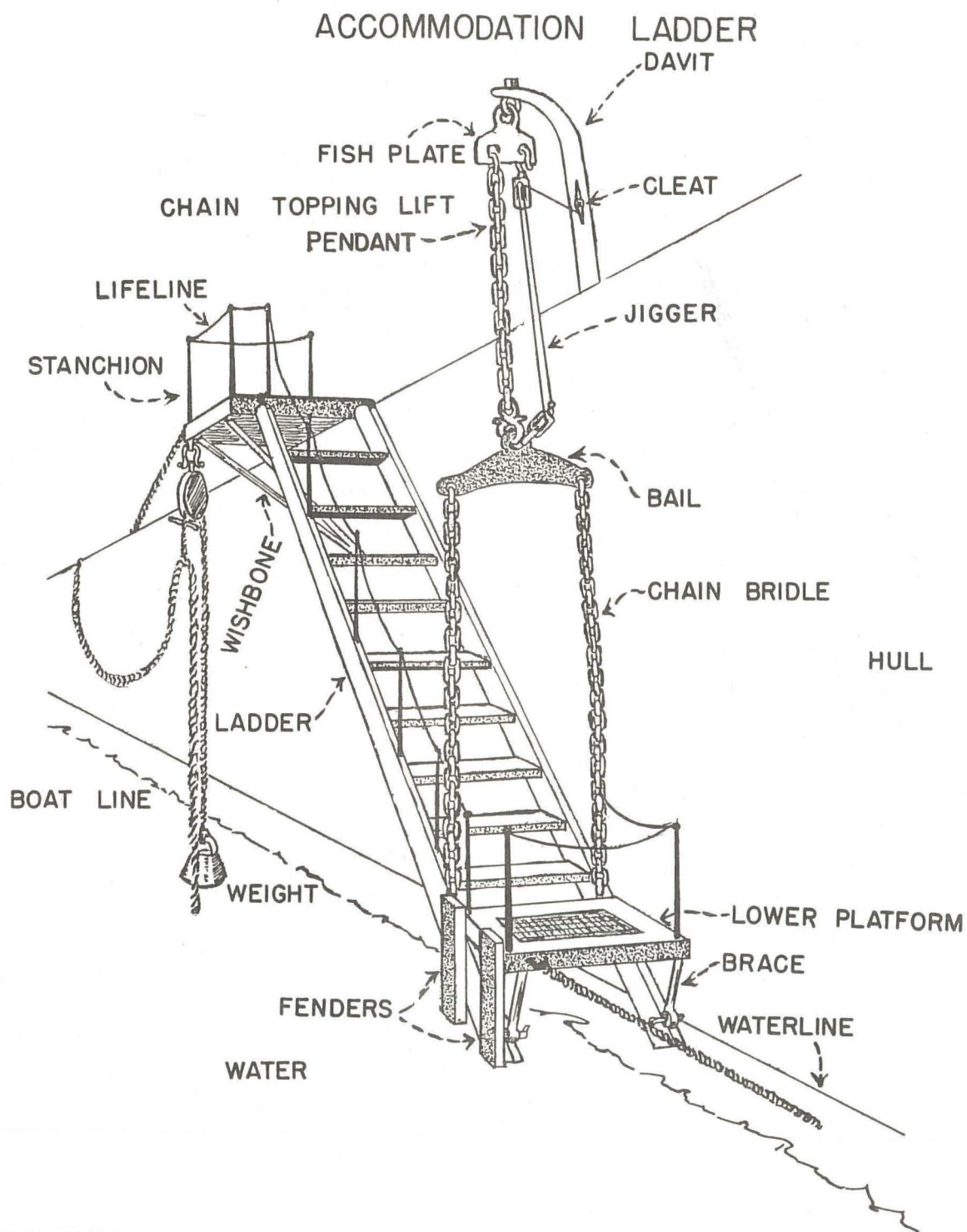
When a boat is ready to be launched, an even strain is taken on both vangs. A strain is taken on the steadying lines as necessary to keep the boat from swinging. The boat is then picked up slightly higher than the rubber boat rack, the capstan is stopped. The hauling part is held fast around the capstan while the boat is being boomed out.

While the boat is being boomed out over the side, care must be taken on the part of the man easing out to prevent the boom from suddenly going adrift. At the same time he must ease out enough line to prevent unnecessary strain on the hauling part; which in turn causes excessive wear on the equipment. When the boat is boomed out far enough, the vangs are secured to the pin rail. The boat is kept parallel to the ship by using the steadying lines until the boat is waterborne, and the bow painter and stern fast are secured.

The sling is now unshackled and stowed in the boat. The steadying lines are removed from the boat and fastened to the main purchase to steady it as it is brought back aboard, either to be used to launch the remaining boat or to reseat the cargo boom in its cradle.

To retrieve and cradle boats reverse the above procedure.

To perform this operation efficiently, quickly and safely, "SILENCE MUST PREVAIL". Only the person assigned to run this operation will be giving orders.



APPENDIX VIII

RIGGING ACCOMMODATION LADDER

The accommodation ladder consists essentially of an upper and lower platform, connected by a ladder. (Refer to drawing for details and proper name parts). The lower end of the ladder, which has been connected to the lower platform, is held in place by a chain bridle with a bail, and from the bail a chain leader which shackles to a fishplate on the davit. The lower platform is equipped with leather fenders to protect boats from being damaged when coming alongside.

The following items are required prior to rigging:

Two (2) Yard Tackles	Jigger
Tag Lines	Three (3) Snatchblocks
Manila and Wire Straps	Wrenches and Marlinspikes

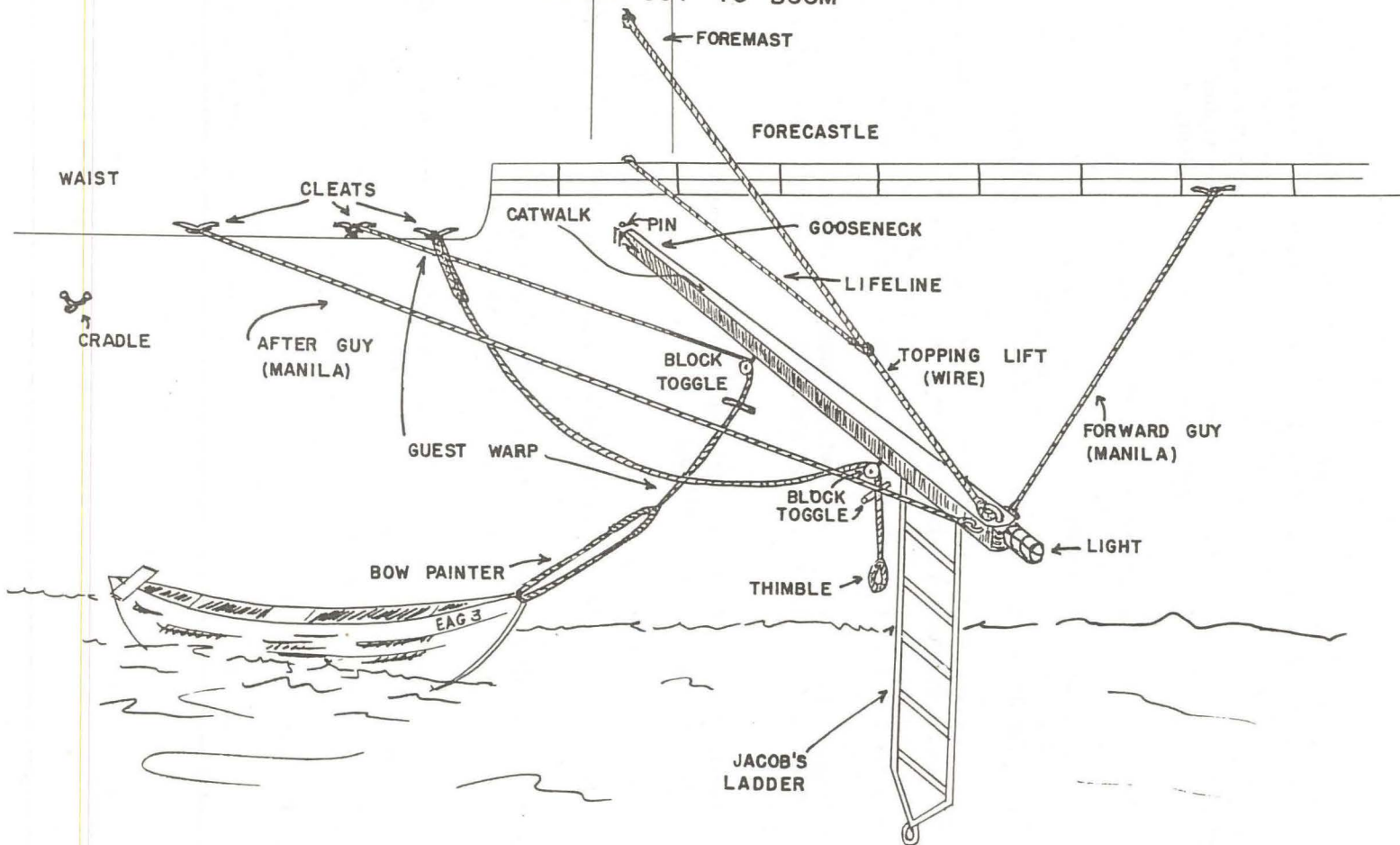
The procedure for rigging the accommodation ladder is not difficult but due to the weight and cumbersome size it is imperative that the initial rigging (yard tackles, straps, etc.) be done properly. If the vessel is under sail, then prior to rigging the ladder, all main sails will have to be put in their gear.

Rigging the accommodation ladder usually takes approximately an hour and a half and under no circumstances should there be more than one person giving orders.

Outlined herewith are eight (8) steps which if followed in this order will cut down time and insure proper rigging.

1. Square the main yard.
2. Bring to the vicinity of mainmast all sections and fittings of the ladder and separate them.
3. Pass one strap around the main yardarm directly over the ship's side, and the other further inboard. Rig purchase; lead hauling parts through snatchblocks on deck.
4. Secure lower platform and fenders to foot of ladder while laid on deck. Shackle bail to rings near foot of ladder.
5. Rig upper platform to bulwark: Pass strap around outer side of platform and hoist into position. Pass toggle pin. Ship gratings.
6. Pass strap through topmost tread of ladder, center it and shackle to purchase. Hoist ladder vertically until clear of rail and sway outboard. Hook jigger between davit head and foot of ladder. Shackle one end of chain leader to fishplate (largest eye) and other end to yoke. Ease yard tackle until top of ladder can be pinned to upper platform.
7. Lower away on jigger until bail takes weight of ladder.
8. Rig stanchions, handrails, manropes and guest warp (boat grabline).

STB. BOAT BOOM RIGGED/NO. 3 BOAT
HAULED OUT TO BOOM



APPENDIX IX

RIGGING BOAT BOOMS

The purpose of the boat booms are for vessels laying at anchor or moored to a mooring buoy to allow small boats to tie up to the ship well clear of the side. The order to a boat alongside to tie up to a boom is: "Haul out to the port (starboard) boom".

A boat boom (see drawing) consists of a stout spar, secured by its gooseneck (inboard end fitting) to a pin in the side so as to allow free motion fore and aft in a horizontal plane. The outboard end of the boom hangs from a topping lift which is a single wire cut to a length which will keep the boom constantly at the proper height. Fore and aft motion of the boom is controlled by lines called forward and after guys.

A strong 3 or 3 1/2 inch manila line called a "guest warp" leads from a forward point on the ship out through a block at the outboard end of the boom. The outboard end of the guest warp is spliced around a metal thimble through which boats reeve their bow lines. A toggle is seized between strands of the guest warp above the thimble, to keep the latter from running up out of reach when a boat lets it go. One or more "Jacob's Ladders" hanging from the boom make it possible for boat's crews to get aboard the ship. The lifeline is made from a 2 inch nylon line and is approximately 3 feet above the catwalk, one end is made fast to the topping lift; the other end is secured to ship's railing or stanchion.

Rigging out the boom is a simple process. The boom stows in a chock alongside, with its outboard end aft. Ladder, guys, topping lift, and guest warps are attached, and the guys led out fore and aft. The after guy is marked at the point where it belays; it is belayed at this point and the slack coiled down free for running. The boom is started out by a shove with a boat hook and the forward guy is hauled hard until the after one comes taut.

A boat is always made fast to a guest warp by the "bight" of its bow line, with the end secured back in the boat. This is to facilitate quick letting go. The boat should always ride to a long lead on the bow line. The shorter the lead, the more vertical the strain, and the more of the boat's weight there will be on the bow line as she rides up and down on swells. Boats at booms have parted their lines or pulled out cleats or pad eyes because the leads on their bow lines were too short.

Every man traveling over a boat boom must wear a life jacket, use the life line, and exercise caution against falling.

APPENDIX X

INSTRUCTIONS TO BOAT COXSWAINS; BOAT ETIQUETTE

A. DUTIES OF COXSWAIN

1. See to cleanlines and readiness of boat at all times. Report all deficiencies to O.O.D. promptly.
2. Require boat crew to be in proper uniform. Arrange for necessary reliefs during meal hours.
3. Insure proper personal flags, command pennants, and flag staff insignia are displayed as required.
4. Obtain adequate instructions and understand them before shoving off.
5. Report back to O.O.O.D. upon return to ship after securing boat.
6. Normally secure #1 boat to starboard boom, #2 to port boom.
7. Make any mistakes on the conservative side.

ALWAYS:

Check fuel tank frequently.
Distribute personnel so boat is trimmed slightly by the stern.
Maintain order in the boat.
Give commands in a clear, strong voice.
Stow inside the boat all gear not needed - painters, fenders, etc.
Shove off by going ahead whenever possible. (Shove off "hard in the bow" and wind and current will help you sail clear.)
At shore landing, turn around when light so as to have bow out to facilitate getting away from landing when loaded.
Check running lights at night before each run between ship & landing.
Use minimum speed in making landings; kill headway with engine.
Keep "bows-on" to a swell when possible.
Watch the ship for signals; obey recall when hoisted.
When landing alongside another ship, request permission to come alongside and to shove off.
Idle engine when shifting clutch.
Keep boat shipshape.
Make landings stemming the current when possible.
Use butt end of boat hook to fend off.

NEVER:

Overload a boat.
Lie alongside longer than necessary.
Run under boat boom or across the hawse. (When passing under stern of any vessel, anchored or underway, give adequate clearance.)
Permit smoking in boat.
Exceed cruising speed (2/3 throttle) except in emergency.
Set up a wake which will disturb moored or passing craft.
Run with fenders over side.

B. DUTIES OF BOAT CREW

1. Be in proper uniform at all times when on duty.
2. Be alert for and acknowledge coxswain commands.
3. When coming along side and pushing off always use "BUTT" end of boat hook.
4. While underway, bowhook and sternhooks shall remain at attention with boat-hooks held vertical and resting on the butt.

C. EMBARKING, SALUTING, ETC

1. Coxswains salute when officers enter or leave boats. Also salute when acknowledging orders from O.O.D. or other officers.
2. Officers in a boat rise and salute Commanding Officers or Flag Officers entering or leaving.
3. Cadets in the stern sheets of a boat salute when a commissioned officer enters or leaves.
4. Seniors board the boat last and leave it first. Generally, seniors sit aft and on the starboard side.
5. At a crowded landing, boats carrying seniors should be given the opportunity to land first. Coxswains should be courteous, especially where boats of a foreign service are involved.
6. At morning or evening colors, the coxswain of a boat passing near a man-of-war (U.S. or foreign) shall lay to and salute.

D. BOAT HAILS, INSIGNIA, ETC

1. Boat hails are used to indicate the senior person aboard:

Squadron Commander - Squadron
Commanding Officer - Name of ship
Other commissioned officers - AYE, AYE
Warrant officers and cadets - NO, NO
Enlisted men - HELLO
If not going alongside - PASSING

2. Pennant and flagstaff insignia are as follows:

Flag officer - Gilt halberd
Captain - Gilt ball
Commander - Gilt five-pointed star
Others - Flat truck

3. The national ensign shall be displayed from C.G. boats:
 - When underway during daylight in a foreign port.
 - When ships are required to be dressed or full dressed.
 - When going alongside a foreign vessel.
 - When an officer or official is embarked on an official occasion.
4. When an officer in command is embarked in a boat, on official occasions, his personal flag, command pennant, or, if not entitled to either, a commission pennant shall be displayed from the bow staff. On these occasions the coxswain shall ascertain the destination of the officer and the desired time of arrival at the destination. Every reasonable effort shall be made to insure that the arrival at the destination is on time.
5. When a U.S. civil official is embarked in a boat, on official occasions, the prescribed flag shall be displayed from the bow staff.
6. If two officers in command are embarked in the same boat, the personal flag or command pennant of the senior shall be displayed from the bow staff.
7. If an officer in command and a U.S. civil official are embarked in the same boat, the personal flag, command pennant or prescribed flag of the senior shall be displayed from the bow staff.

APPENDIX XI

DISPLAY OF FLAGS AND PENNANTS

The following is a summary of the information found in Coast Guard Regulations and DNC 27 concerning U.S. Naval Flags and Pennants. It will be to your interest to become familiar with the uses of the various flags and customs concerning same before reporting to relieve the deck:

A. IN BOATS

1. The national ensign shall be displayed from waterborne boats of the Coast Guard
 - a. When underway during daylight in a foreign port.
 - b. When ships are required to be dressed or full-fressed.
 - c. When going alongside a foreign vessel.
 - d. When an officer or official is embarked on an official occasion.
 - e. When a flag or general officer, a unit commander, a commanding officer, or a chief of staff, in uniform, is embarked in a boat of his command or in one assigned to his personal use.
 - f. At such other times as may be prescribed by the senior officer present.
 - g. Since small boats are a part of a vessel, they shall follow the motions of the parent vessel as regards the half-masting of colors.

B. DIPPING

1. When any vessel, under United States registry or the registry of a nation formally recognized by the Government of the United States, salutes a ship of the Coast Guard by dipping her ensign, it shall be answered dip for dip. If not already being displayed, the national ensign shall be hoisted for the purpose of answering the dip, the dip returned, and, after a suitable interval, the ensign hauled down. An ensign being displayed at half-mast shall be hoisted close up before a dip is answered.
2. No ship of the Coast Guard shall dip the national ensign unless in return for such compliment.

C. BROAD AND BURGEE COMMAND PENNANTS

1. The broad or burgee command pennant shall be the personal command pennant of an officer of the Coast Guard, not a flag officer, commanding a unit of ships or aircraft.
2. The broad command pennant shall indicate command of:
 - a. A force, flotilla, or squadron of ships or craft of any type.
 - b. An aircraft wing.
3. The burgee command pennant shall indicate command of:
 - a. A division of ships or craft of any type.
 - b. A major subdivision of an aircraft wing.

D. IN BOATS

1. An officer on command, or a chief of staff when acting for him, when embarked in a boat of the Coast Guard on official occasions, shall display from the bow his personal flag or command pennant, or, if not entitled to either, a commission pennant.
2. An officer entitled to the display of a personal flag or command pennant may display a miniature of such flag or pennant in the vicinity of the coxswain's station when embarked on other than official occasions in a boat of the Coast Guard.

E. HALF-MASTING

1. Personal flags, command pennants, and commission pennants shall not be displayed at half-mast except as prescribed in Navy regulations for deceased official or officer.

F. CIVIL OFFICIALS IN BOATS

1. A flag shall be displayed in the bow of a boat in the Coast Guard whenever a United States civil official is embarked on an official occasion as follows:
 - a. A Union Jack for:
 - (1) A diplomatic representative of, or above, the rank of charge d'affaires, within the waters of the country to which he is accredited.
 - (2) A governor general or governor, commissioned as such by the President, within the area under his jurisdiction.
 - b. The consular flag for a consular representative.
 - c. The prescribed personal flag for other civil officials when such officials are entitled to the display of a personal flag during an official visit.

G. ABSENCE INDICATORS

1. In ships, the absence of an official or officer whose personal flag or pennant is displayed, a chief of staff, or a commanding officer, shall be indicated from sunrise to sunset by the display of an absence indicator as prescribed in table shown below. In the case of the absence of a commanding officer who is acting as a temporary unit commander, both absentee pennants should be displayed.

SUB	INDICATION	DISPLAY ON	ABSENTEE
1st	Absence of an official from his ship for a period of 72 hours or less.	Starboard main yardarm (out-board).	Absence of a flag officer or unit commander whose personal flag or command pennant is flying in this ship.
2nd	Same as 1st Substitute.	Port main yardarm (inboard) .	Absence of Chief of Staff.
3rd	Same as 1st Substitute.	Port main yardarm (inboard).	Absence of Captain Executive Officer if Captain is absent for a period exceeding 72 hrs.
4th	Same as 1st Substitute.	Starboard main yardarm (out-board).	Absence of civil or military official whose flag is flying in this ship.

APPENDIX XII

DRESSING AND FULL DRESSING SHIP

A. DRESSING SHIP

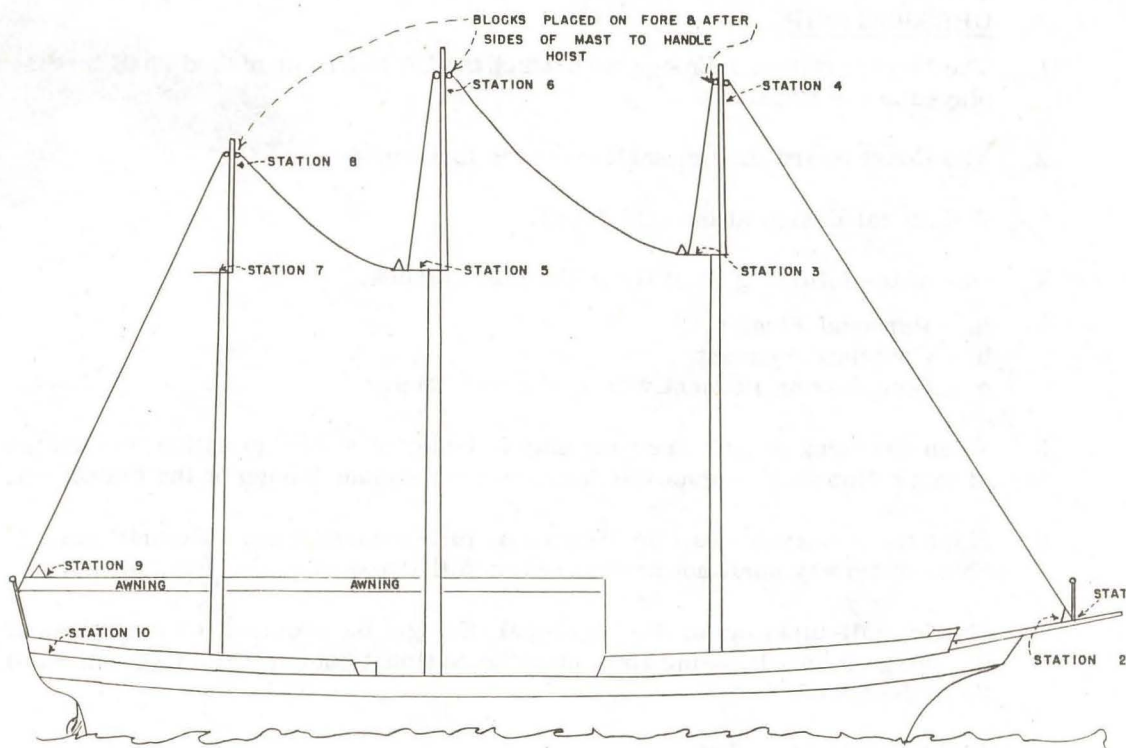
1. The largest National Ensign with which the EAGLE is furnished shall be displayed at the flagstaff.
2. The Coast Guard Ensign shall be at the foretruck.
3. A National Ensign at the maintruck.
4. One of the following shall fly at the mizzen truck:
 - a. Personal Flag
 - b. Command Pennant
 - c. Commission Pennant with a National Ensign
5. When dressing or full-dressing ship in honor of a foreign nation, the ensign of that nation shall replace the United States National Ensign at the maintruck.
6. Ships not underway shall be dressed or full-dressed from 0800 until sunset. Ships underway shall not be dressed or full-dressed.
7. Should half-masting of the National Ensign be required on occasions of dressing or full-dressing ship, only the National Ensign at the flagstaff shall be half-masted.

B. FULL-DRESSING SHIP

1. In addition to the dressing of the mastheads, as in dressing ship, a rainbow of signal flags shall be displayed from waterline to waterline, forward-aft, via the mastheads in the following order:

1. 3-flag	17. 8-flag	33. KILO	49. 9-flag
2. 4-flag	18. UNIFORM	34. 6-pennant	50. 4th Sub.
3. 1-pennant	19. 6-flag	35. WHISKEY	51. PAPA
4. SIERRA	20. X-RAY	36. Ø-pennant	52. FORM
5. 1st Sub.	21. NEGAT	37. 1-flag	53. VICTOR
6. ALFA	22. 2-flag	38. OSCAR	54. GOLF
7. PAPA	23. PORT	39. 3rd Sub.	55. STARBOARD
8. CHARLIE	24. NOVEMBER	40. HOTEL	56. INDIA
9. MIKE	25. 2-pennant	41. ECHO	57. FOXTROT
10. SPEED	26. TANGO	42. EMERG.	58. QUEBEC
11. JULIETT	27. 2nd Sub.	43. LIMA	59. 8-pennant
12. 5-pennant	28. BRAVO	44. 7-pennant	60. YANKEE
13. ROMEO	29. DELTA	45. Ø-flag	61. DESIG.
14. 9-pennant	30. TURN	46. INT	62. 7-flag
15. ZULU	31. 5-flag	47. DIV	63. 3-pennant
16. CORPEN	32. STATION	48. 4-pennant	64. SQUADRON
			65. ANSWER

Then start the sequence over again.



LEGEND AND ASSIGNMENTS

- | | | | |
|------------|---|-------------|---|
| △ | Denotes flags piled, and ready for running. | Station 6: | One man to place blocks and observe hoist; handles fouls and other emergencies at blocks. |
| Station 1: | Two men to handle flag on staff. | Station 7: | Three men to tend halyards and handle flags as required. |
| Station 2: | Two men to handle fore triangle flags. | Station 8: | One man to place blocks and observe hoist; handles fouls and other emergencies at blocks. |
| Station 3: | Two men to tend halyards; one man to handle fore-to-main flags. | Station 9: | One man to tend mizzen-to-stern flags. |
| Station 4: | One man to place blocks and observe hoist; handles fouls and other emergencies at blocks. | Station 10: | Two men to handle flag on staff. |
| Station 5: | Two men to tend halyards; one man to handle main-to-mizzen flags. | | |

2. Jackstaff to Foremast:

- a. Set block above the fore royal stay on the forward side of the mast.
- b. Secure the halyard at the foot of the jackstaff, and reeve through the block down to the fore crosstree.
- c. Mark the halyard 150 feet from foot of the jackstaff and bend on the first 25 flags in accordance with the order in paragraph 1.B. Connect hooks to snap rings. Lay out free for running at the foot of the jackstaff.

3. Foremast to Mainmast:

- a. Foretruck to maintruck is 88 feet and requires the next 13 flags in order from paragraph 1.B.
- b. Place blocks on after side of foretruck and forward side of maintruck.
- c. Reeve halyard from fore crosstree through foretruck block to maintruck block and down to main crosstree.
- d. Bend on and make up for running the 13 flags. Stop-off these flags and halyard in the fore crosstree.
- e. Set foremast to mainmast flags from main crosstree. Set taut from fore crosstree.

4. Mainmast to Mizzenmast:

- a. Maintruck to mizzentruck is 68 feet and requires the next 12 flags in succession in paragraph 1.B.
- b. Blocks are set similar to "foremast to mainmast". Likewise, halyards reeved and 12 flags bent on free for running. This halyard and flags are stopped-off on the main crosstree.
- c. Set the mainmast to mizzenmast flags from the mizzen top. Set taught from the main crosstree.

5. Mizzenmast to Flagstaff:

- a. Mizzentruck to flagstaff, at level of awning, is 107 feet and requires the next 19 flags in succession contained in paragraph 1.B.
- b. Secure halyard at point on flagstaff level with the awning and reeve through block, previously rigged on after side of mizzentruck, down to the mizzen top.
- c. Mark the halyard 107 feet from the flagstaff. Bend on the 19 flags previously designated and lay out free for running on top of the awning.

APPENDIX XIII

EAGLE GLOSSARY

Note: Terms followed by an asterisk (*) are used as commands.

ABACK - A sail is aback when the wind is striking it on the opposite side from the normal situation; done on purpose in maneuvering or can happen accidentally.

AVAST* - Stop executing last command and hold what you have. Do not belay until directed.

BACKSTAY - Standing rigging led from a point on the mast to the rail abaft the mast.

BELAY* - Secure the line to the belaying pin, cleat, or other point established for the purpose.

BOARD THE TACK* - Hook a special tackle (tay-kul) called the "tack jigger" in the weather clew of the foresail or mainsail and haul it down to the rail. Done when sailing close-hauled.

BOBSTAY - A heavy stay (a steel rod on EAGLE) running from the stem to the bowsprit.

BOLTROPE - Roping around the edges of a sail.

BOOM - A spar used to extend the foot of a fore and aft sail.

BOXING - A maneuver sometimes used when the vessel has missed stays or has been taken aback; the head yards are kept aback and as the vessel loses headway the bow pays off rapidly to leeward, at which point the maneuver of wearing ship may be carried through.

BRACES - Running rigging used to swing the yards in a horizontal plane.

BRACE IN - To swing the yards more athwartships or perpendicular to the keel.

BRACE UP - To swing the yards more fore and aft.

BRAILS - Lines used in furling the spanker, to bring it in to the mast.

BUNTLINES - Lines used to furl a squaresail and bring the foot up to the yard.

CAP - A band at the head of a mast.

CAST or CASTING - To swing the vessel's head as necessary for getting under-way.

CLEAR AWAY* - Lay out a coil so that the line will run freely. Applies to down-hauls, weather staysail sheets, etc.

CLEW DOWN* - To haul on the clewlines while holding the sheets in order to settle a yard.

CLEW GARNETS - Special term for the clewlines of the foresail and mainsail (courses).

CLEWLINES - Lines led to the lower corners of a squaresail, to bring them up to the yardarms when furling.

CLEW UP - To bring the sail up in its gear by slacking sheets and hauling clewlines, buntlines and leechlines.

COURSES - The collective term for the foresail and mainsail. A correct usage might be "SET THE COURSES". Where only one mast is referred to, use the words, FORSAIL, MAINSAIL, FOREYARD, MAINBRACE, etc. COURSES should be a little-used word. COURSE should be reserved for the desired heading of the ship.

CRANE LINES - Athwartship cables for men to work between the shrouds—similar to ratlines.

CRINGLE - Iron ring in the boltrope of a sail at the head, clew or leech.

CROSSTREES - Athwartship members located where the topmast and topgallant mast come together.

DOLPHIN STRIKER - A strut or brace extending almost vertically downward from the bowsprit to the bobstay.

DOWNHAUL - Line led to the deck from head of a staysail for hauling it down.

EARRING - A short piece of line secured to a cringle for hauling out the head of a squaresail when bending it on the yard.

EASE* - Pay out slowly and with care; reduce strain on the line. Use for halyards, etc.

FULL AND BY - Sailing close to the wind with the sails drawing full and conforming to the changes in direction of the wind.

FURL - To take in a sail and secure it.

GAFF - A spar on the mizzen used for extending the head of the spanker.

GANTLINE - A whip (purchase) rigged aloft for general utility purposes.

GASKET - Line or canvas strap used to secure a sail when furled.

HALYARD - Running rigging used to hoist and lower sails and yards.

HAND OVER HAND* - Face towards the point of pull (opposite the direction of pull) and pull first with one hand and then with the other.

HANK - Circular metal fitting which rides on a stay and to which the luff of a staysail is seized.

HEAVE AROUND* - To haul on a line by machinery. Since this is very seldom the case with us, the command does not deserve its present vogue. The proper command is HAUL, or one of its variations.

HEAVE TO - (UNDER SAIL) To kill the ship's headway by turning into the wind or by backing the yards on one or more masts.

INHAUL - Line used to haul in the head or foot of the spanker.

IN ITS GEAR - When a sail has been drawn up and is being held by its gear—buntlines, leechlines and clewlines.

JACKSTAY - A metal rod to which sails or lines are fastened.

JIGGER - A handy purchase (tackle), generally used to take additional strain running rigging.

LEE - On the side away from the wind.

LEECH - The after edge of a fore-and-aft sail; the sides of a squaresail.

LEECHLINES - Lines led to the sides of a squaresail to bring them up to the yardarms when furling.

LET GO AND HAUL* - Command to swing the yards of the foremast to the opposite tack when maneuvering under sail.

LIFTS - Standing lifts are rigged on royal, topgallant and upper topsail yards to keep them level when fully lowered; running lifts are rigged on the fore and main yards to permit canting of all the yards (with sails set) as required.

LUFF - The forward edge of a fore-and-aft sail; the shake or slat of a sail when the sheet is too slack or the vessel too close to the wind.

MAINSAIL HAUL* - Command to swing the yards of the mainmast to the opposite tack when maneuvering under sail.

MARRY - To place two lines together in order to haul them at the same time.

MASTHEAD - The top of a lower mast, where foretop or maintop is situated.

MAN* - Station sufficient men to haul on the line against the anticipated strain.

ON THE WIND - Close-hauled, or sailing as close to the wind as possible.

OUTHAUL - Line used to haul out the head or the foot of the spanker.

OVERHAUL* - Assist in rendering freely. Applies to extending a tackle, pulling up slack in buntlines, etc.

PEAK - The upper after corner of a fore-and-aft sail.

PENDANT - A short piece of line or wire with an eye at each end used for hanging off a block, footrope, etc.

POLE - The upper end of the highest mast, between the royal yard and the truck.

RISE TACKS AND SHEETS* - Command to clew up the mainsail when maneuvering under sail.

ROBAND - Short length of marlin used to secure the head of a squaresail to the jackstay, or the luff of a headsail to the hanks.

ROUND IN* - Bring the blocks of a tackle together by hauling on the line.

RUN AWAY WITH* - Face in the direction of pull, grasp the line with both hands and run.

RUNNING RIGGING - Movable lines and blocks used for controlling sails, yards, etc.

SHEET - Running rigging secured to the clew of a sail (opposing a clewline).

SHROUDS - Standing rigging used to suport a mast laterally, led athwartships from aloft to the rail.

SLACK* - Pay out fairly rapidly; remove most of the strain from the line.

SPREADER - Extension projecting horizontally at the crosstrees to spread backstays.

STANDING PART - The fixed part of any piece of running rigging; the end which is secured permanently.

STANDING RIGGING - Rigging which has no movable parts, shrouds, backstays, etc.

STAYS - Standing rigging in line with the ship's keel; some stays carry staysails. A vessel "in stays" has the wind fore-and-aft sail.

TACK - A line leading forward from the clew of the foresail or mainsail; the lower forward corner of a fore-and-aft sail.

TACKING - A sailing maneuver; the process of bringing the ship's head through the wind to get the wind on the opposite side.

TACK JIGGER - A tackle used to haul down the weather tack of foresail or mainsail.

TEND* - Station one man or at most two for the purpose of slacking or keeping the slack out of a line.

THAT'S WELL* - Basically same meaning as AVAST. Used in final trimming. For example: HAUL ON YOUR WEATHER (FORE) BRACES - THAT'S WELL THE FOREBRACE, WELL THE UPPER TOPSAIL BRACE, WELL THE ROYAL BRACE, WELL ALL. BELAY.

THROAT - The forward upper corner of a fore-and-aft sail.

THROW OFF* - Take off pin and see that it runs freely. Never applies to lines under a heavy load, i.e., halyards, except in real emergencies. Use for buntlines when setting sail.

TOP - Platform at the top of a mast, as foretop or maintop, not the actual uppermost point.

TOPPING LIFT - Purchase used for raising or taking the weight of a boom.

TRIM* - Implies an adjustment of a sail by hauling in on sheet (fore and aft sails) or brace.

UNFURL - To cast loose a sail by throwing off the gaskets.

WEATHER - On the side toward the wind.

WEARING - A sailing maneuver; the process of bringing the ship's stern through the wind to get the wind on the opposite side.

YARD - A spar rigged horizontally on a mast, to which the head of a square-sail is bent (made fast).

VANG - A line led from the mizzen gaff to the deck to keep it steady when the spanker is not set (used in pairs on EAGLE).



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